

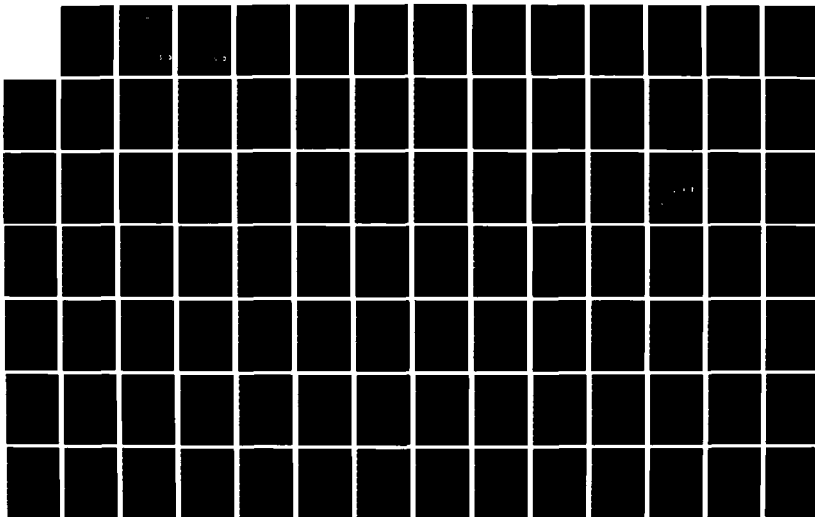
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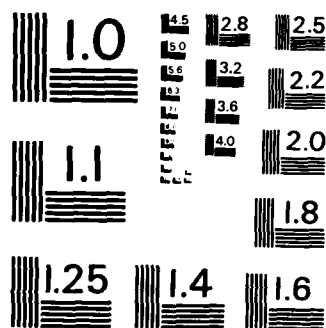
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THE IMPACT OF DIFFERENT LEVELS OF
WEAPON SYSTEM SOPHISTICATION ON THE
MANAGEMENT OF FMS OBJECTIVES:
A STUDY OF THREE ROK CASES

THESIS

Elaine A. Robinson
First Lieutenant, USAF

AFIT/GLM/LSM/85S-68

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SOPHISTICATION ON THE MANAGEMENT OF FMS OBJECTIVES:
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THESIS

Presented to the Faculty of the School of Systems and Logistics
of the Air Force Institute of Technology
Air University
In Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Logistics Management

Elaine A. Robinson, B.A.
First Lieutenant, USAF

September 1985

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Acknowledgements

I would like to express my appreciation to the many individuals in the foreign military sales community whose assistance was instrumental in completing this research effort. Most notably, the program managers in the Korean Division of the International Logistics Center--Captain Scott Byers, Ms. Jean Graham, and Mr. Thomas Koepnick--and the program managers in the Aeronautical Systems Division--Major David Abati, Captain Richard Alvarado, and First Lieutenant Daniel Bell.

I am especially indebted to Dr. Larry Mortsolf for his technical expertise and insight, which contributed greatly to the quality of my thesis. Finally, my sincere appreciation to my thesis advisor, Dr. Leslie Norton, whose guidance and advice facilitated the successful accomplishment of this research project.

Elaine A. Robinson

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Abstract

In recent years, the sale of weapon systems to foreign nations has involved weapons of much greater sophistication than previously sold. U.S. Air Force Foreign Military Sales managers are faced with fulfilling cost, schedule, performance, and logistics objectives without regard to the level of sophistication involved. This thesis examines the management challenges associated with developed weapon systems and advanced weapon systems through a case study of three South Korean FMS programs.

As a background to the management task, the environments of the U.S. and the ROK are presented, then the three programs are examined in terms of the management of cost, schedule, performance, and logistics objectives. The three cases are: Peace Freedom III, the coproduction of the F-5E/F, Peace Voice, the purchase of the AN/GRC-206 ground control radio, and Peace Bridge, the purchase of the F-16C/D. The impact of the different levels of sophistication upon the management task and how managers fulfill the program requirements are examined in detail. Conclusions regarding the implications of advanced system sales and potential management actions are presented.

THE IMPACT OF DIFFERENT LEVELS OF WEAPON SYSTEM
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I. Introduction

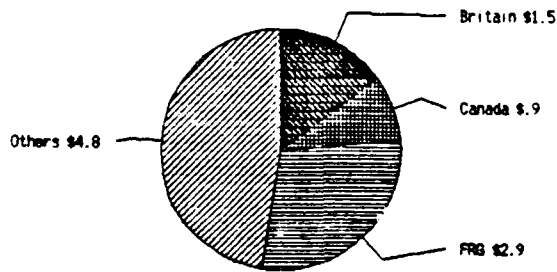
Since World War II, military assistance has been a consistent element of U.S. foreign policy. The Foreign Military Sales (FMS) program, which is an integral part of military assistance, has existed for over three decades, but the total dollar volume of these sales has increased dramatically in recent years (See Figure 1). Over one half of the total FMS expenditures have occurred since 1975 (14:I-1). Between 1950 and 1984 U.S. Foreign Military Sales worldwide exceeded \$144 billion, of which \$70.5 billion or some 49 percent of the sales were conducted in fiscal years 1980 through 1984 (15:3). Sales are estimated at \$14.5 billion for fiscal year 1985 and projected at \$13 billion for fiscal year 1986 (66:40).

Along with this increase in the volume of sales has come a shift in the status of recipient nations. Prior to the conflict in Southeast Asia, the majority of weapons sold by the United States went to developed nations, principally, to members of the NATO alliance. Since the mid-1970s, However, the market has been dominated by Third World countries. Between 1969 and 1978, weapon purchases by the

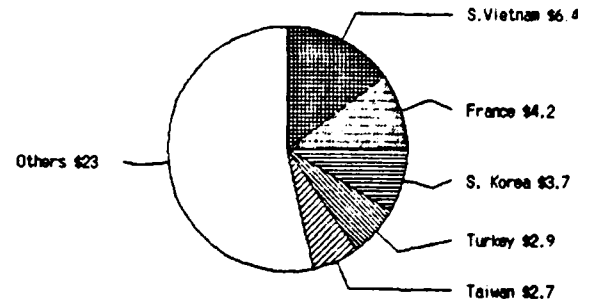
1950-1970

\$54 billion

CASH SALES
\$11 billion



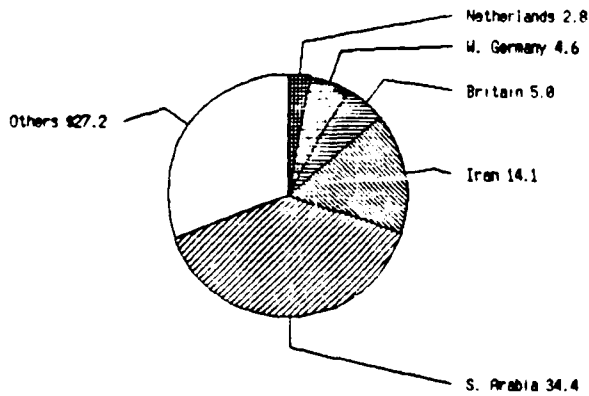
AID
\$43 billion



1971-1980

\$123 billion

CASH SALES
\$88 billion



AID
\$35 billion

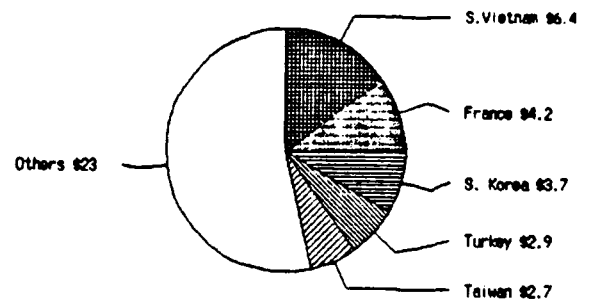


Figure 1. U.S. Weapons Exports 1950-1970 and 1971-1980
(67:11)

developing world more than doubled, and today, the Third World receives over 75 percent of the arms sold worldwide (53:13).

The nature of the weaponry sold to foreign governments has undergone a fundamental change as well. In his recent testimony before the House Foreign Affairs Committee, the Department of State Under Secretary for Security Assistance, Science and Technology, William Schneider, Jr., stated

First, there's been the reduction in the availability of what one might call secondhand or cast-off aircraft. That market is considerably less than it was in the fifties or the sixties.

Second is the character of the threat. The dispersion of very advanced military technology by the Soviets to the Third World countries has raised the requirement for technical performance on the part of aircraft that we sell to friendly countries. This has in turn driven the demand up for high performance aircraft, higher than we would have contemplated giving 15 or 20 years ago.

And the combination of those two issues has in turn tended to focus the demand on a narrow segment of the international aircraft market; namely, advanced, high performance, force structure aircraft (13:55).

This combination of the higher levels of Foreign Military Sales, the increasing demand for sophisticated weaponry, and the growing number of purchases by the Third World is producing a significant change in the arms of nations and in U.S. military assistance policy.

Problem Statement

There is uncertainty and confusion surrounding U.S. decisions to sell different levels of sophistication of weapons in light of this changing nature of Foreign Military

Sales. It is unclear whether the sale of developed weapon systems and/or state-of-the-art weapons are in the best interests of both nations involved in the transaction. Through a case study of the Republic of Korea (South Korea), this thesis will examine whether there is a significant and identifiable difference between managing the sale of developed weapon systems and managing the sale of advanced weapon systems to South Korea in terms of the ability to meet cost, schedule, performance, and logistics criteria as a fundamental objective of the sale. Further, alternatives to and implications of the sale of these different levels of sophistication are explored.

Definition of Terms

Security Assistance. Security assistance is a broad term encompassing a number of programs and concepts related to U.S. national security interests. The Defense Security Assistance Agency defines security assistance as a

Group of programs authorized by the Foreign Assistance Act of 1961, as amended, and the Arms Export Control Act, as amended, or other related statutes by which the United States provides defense articles, military training, and other defense related services, by grant, credit or cash sales, in furtherance of national policies and objectives (16:B-15).

Foreign Military Sales. FMS is one of the programs within the scope of security assistance. It is conducted under the authority of the Arms Export Control Act of 1976, as amended. The U.S. Foreign Military Sales program involves the sale of "military equipment and services to

friendly foreign governments and international organizations ..." (17:A1-3). Consistent with the policy of these sales is the understanding that the transaction is in support of U.S. national security objectives. The United States government receives no monetary gain on these sales; that is, the recipient nation pays an amount which is calculated to cover estimated costs with no profit to the U.S. government.

Developed Weapon System. For the purpose of this research, a developed or mature weapon system is one which has been in the U.S. Air Force inventory for several years at the time of sale to the foreign nation, usually has an established Foreign Military Sales configuration, and is subject only to occasional engineering changes and modifications in order to maintain worldwide system standardization.

The Northrup F-5 aircraft falls under this category of weapon system. It has been widely purchased by FMS customers, including the Republic of Korea (ROK). The South Koreans are currently coproducing the F-5E/F, which is an updated and improved version of the F-5s already flown by the Korean Air Force.

Advanced Weapon System. As used in this research effort, an advanced weapon system involves state-of-the-art technology and is at the leading edge of U.S. defense capabilities. Generally, it is not yet in the U.S. Air Force inventory at the time of purchase by the foreign government, is undergoing developmental and initial operational test and

evaluation, is subject to ongoing and frequent engineering changes, and does not have an established FMS configuration.

On July 19, 1984 the U.S. Air Force received the first General Dynamics F-16C and began operational test and evaluation in December (4:34). The F-16C (one-place)/F-16D (two-place trainer) is an improved version of the F-16A/B, making it the most advanced fighter aircraft now operated by the U.S. The AN/GRC-206 radio is also an advanced weapon system. It is a ground control radio providing communication from aircraft to ground targets and is defensive in nature (10). The system is a joint purchase by all four U.S. military services. In October 1984, the first ten units of the radio were delivered by Magnavox, the prime contractor: three for the U.S. to begin its training and seven to the ROK (10).

Intermediate Weapon System. An intermediate, export-version weapon system falls somewhere between the developed and the advanced weapon systems and is designed with the FMS customer in mind. Within this class of weaponry is the FX fighter aircraft. "The FX policy is intended to enable the United States to sell cheaper, less sophisticated and more appropriate fighter aircraft to Third World countries" (13:1). The FX policy was implemented by President Carter in 1977 in an effort to restrain the sale to Third World governments of front-line U.S. fighter aircraft while, at the same time, offering the nations a higher performance weapon system than previously available.

The Northrop F-20, a more developed version of the F-5 and formerly designated the F-5G, is the most widely publicized and well known intermediate export fighter. It is considered to be superior to its forerunner, the F-5, but less capable than the state-of-the-art F-16. The F-20 has not yet been purchased by the U.S. or any foreign government, though sales to both the ROK and U.S. Air Forces are under discussion.

Research Methodology

To enable an in-depth and sufficiently narrow examination of this issue, a case study of three current Republic of Korea, U.S. Air Force-managed Foreign Military Sales programs will be conducted. These programs provide the framework for the study of the different levels of weapon system sophistication available to FMS customers: developed systems through "Peace Freedom III," the coproduction of the F-5E/F, and advanced systems through "Peace Bridge," the F-16C/D sale and "Peace Voice," the AN/GRC-206 ground control radio.

South Korea presents a well-integrated portrait of the various issues requiring examination. It is one of the leading purchasers of weapon systems from the U.S. and is an important and long-standing U.S. ally and security interest in East Asia. Further, the ROK is confronted with the dilemma of budgetary constraints, a constant and formidable threat from North Korea, and a desire for sophisticated weaponry. Finally, as a developing nation, South Korea is

faced with difficult decisions trading off military strength and economic growth.

Research Design

Source documents can be divided into six categories:

1. Books, theses, and reports;
2. Department of Defense and U.S. Air Force regulations, manuals and directives;
3. Congressional hearings, reports, and policy statements of past and present administrations;
4. Periodicals and newspapers;
5. Program management plans, minutes of meetings, correspondence, and other unpublished materials contained in program files;
6. Unstructured personal interviews conducted with personnel of the Aeronautical Systems Division of the Air Force Systems Command and the International Logistics Center of the Air Force Logistics Command.

Limitations and Assumptions

In any unclassified research project, certain data will be unavailable. Specific information regarding numbers and types of weapon systems in the inventories of foreign governments, internal policies and factors contributing to decisions made by both the United States and foreign governments, and military weaknesses of FMS customer nations will be limited. Therefore, it is assumed that the information releasable to the public reflects general trends within FMS

and the motives of the United States and South Korean governments.

Further, the case study of one country's Foreign Military Sales program is a small sample and cannot specifically indicate other nation's needs and motives. However, trends and issues affecting the South Korean program are assumed to be representative of a broad current in Foreign Military Sales that has widespread impact and relevance to the spectrum of FMS activities.

Finally, the Northrop F-20 aircraft, discussed in Chapter V, has not yet been purchased by any nation. Thus, the assumption must be made that the information regarding the system's performance capability and potential can lead to analytical conclusions about its acceptability as an alternative to developed and advanced weapon systems.

Research Questions

1. What are the policies and economic factors leading to U.S decisions to sell different levels of weaponry to South Korea; in other words, what motivates the U.S. to sell the types of weapons it sells?
2. What is the social, economic, political, and military environment of the ROK that has led to their decisions to purchase the F-5E/F, the F-16C/D, and the AN/GRC-206 radio?
3. What is South Korea's capability for absorbing developed, intermediate and advanced weapon systems; i.e., does a sufficient logistical and monetary base exist?

4. In terms of the three ROK cases studied, how able is the U.S. to meet stated cost, schedule, performance, and logistics objectives in managing these transactions?

5. What impact does the success/failure of the U.S. in fulfilling these objectives have upon the ROK, and what are the alternatives to and implications of selling developed versus advanced systems to them?

Plan of Presentation

The United States is a major supplier of weapon systems to the ROK. Thus, as a backdrop to this research effort, it is necessary to develop a basic understanding of the political and economic forces influencing U.S. decisions on the types of weapon systems to be sold through FMS. Likewise, it is important to understand the political, economic, and social context of South Korea necessitating the purchase of these weapon systems. The earlier chapters focus on the respective environments of these two countries and Korean decisions to purchase selected systems, which lay a foundation for the FMS management challenges. The later chapters investigate the systems that the Koreans have chosen to purchase in terms of specific FMS cases which must now be managed to meet certain objectives.

Chapter II presents the environment of the supplier, the United States, and the weapon system it is promoting for sales to foreign governments, particularly to South Korea.

Chapter III presents the environment of the buyer, South Korea, and the major considerations that led to their decisions to purchase the studied systems.

Chapter IV establishes the FMS management framework by looking at the management structure and the considerations facing managers. In particular, it examines the ROK's ability to absorb various weapon systems and the ability of case managers to fulfill cost, schedule, performance, and logistics objectives of the sale. In so doing, a developed weapon system sale is studied through the F-5E/F coproduction case, Peace Freedom III, in the context of performance characteristics and how successful managers have been at meeting budget, schedule, and logistics requirements for the system. Two advanced system sales are also examined--the Peace Bridge F-16C/D case, for which deliveries are scheduled to begin in April 1986, and the Peace Voice AN/GR-206 radio case, which began delivery in October 1984. Again, the emphasis is on examining the performance levels and the potential for these cases to fulfill cost, schedule, and logistics objectives.

Chapter V presents conclusions and recommendations. It identifies significant differences in managing these system sales and offers U.S. alternatives in the level of sophistication to sell to the ROK, including developed, intermediate, and advanced weapon systems. Finally, it addresses the implications of selling these different levels and what is in the best interest of the two nations involved.

II. The U.S. Foreign Military Sales Environment

Out of the war emerged a strengthened Korean-American relationship. Its heritage is the moral and legal bond between the allies, ties that today are as real and enduring as when they fought in common cause... (59:92).

In June 1950, North Korean forces crossed the 38th parallel in an act of direct aggression against the ROK. Three years later the war ended with the signing of an armistice agreement mutually prohibiting hostile activities. During that period of conflict between North and South, the U.S. had joined forces with other countries to deter the North Korean threat and protect the peace and stability of the region. Over 30 years later, the U.S. and the ROK remain strong, committed partners.

U.S. Interests in South Korea

Objectives. U.S. policy toward the ROK derives from national security objectives. The highest priority national security objective put forth by the Reagan administration is

to deter military attack by the USSR and its allies against the United States, its allies, and other friendly countries; and to deter, or to counter, use of Soviet military power to coerce or intimidate our friends and allies (69:16).

From this national security policy, regional objectives are developed. The East Asia and Pacific region is considered to be of importance to U.S. security. The U.S. maintains numerous treaties with the nations in this region including

Japan, the Philippines, Thailand, Australia, New Zealand, and South Korea. The objectives in East Asia and the Pacific as stated by the Reagan administration are

To maintain the security of our essential sea lanes and of the United States' interests in the region; to maintain the capability to fulfill our treaty commitments in the Pacific and East Asia; to prevent the Soviet Union, North Korea, and Vietnam from interfering in the affairs of others; to build toward a durable strategic relationship with the People's Republic of China; and to support the stability and independence of friendly countries (69:17).

Specifically, in the Fiscal Year 1985 U.S. security assistance request for the region, five objectives to counter economic and security threats were delineated:

1. To strengthen human rights and the commitment to democracy and free markets in the region;
2. To reduce poverty and economic social inequalities which foster violence and invite external interference;
3. To assure access to the markets and raw material of the region;
4. To maintain close, cooperative relationships with countries in strategic proximity to key sealanes of communication; and
5. To protect the front-line states (Korea and Thailand), enhance our treaty relationships (with Korea, the Philippines, and Thailand), and to maintain use of military facilities in the Philippines (73:53).

To support the administration's regional objectives, a specific U.S. defense strategy is created for each region. In South Korea, the U.S. maintains forward-deployed ground

and air forces to deter aggression since North Korea continues its arms build-up and its persistent policy toward reunification of the country by whatever means necessary. In defending against the North Korean threat the U.S. seeks to

support ROK force modernization; encourage standardization and interoperability of U.S. and ROK equipment; encourage provision of facilities for U.S. augmentation forces; discourage Korean purchase or development of arms that could be destabilizing or difficult to support in a conflict; encourage Korea to produce and procure additional war reserve material stocks; and encourage the effective management of Korean defense resources (66:92).

The U.S. also provides economic assistance through FMS credits to help the ROK strengthen its self-defense forces. South Korea receives the largest share of assistance allocations to the East Asia and Pacific region since they face the most formidable military challenge in the region. In the Fiscal Year 1984 Department of Defense security assistance request for the East Asia and Pacific region, \$230 million of the \$436.5 million FMS loan request was targeted for force modernization in South Korea (69:308). In the Fiscal Year 1985 request, another \$220 million in FMS credits was sought for the ROK, which again represented the greatest share of the region's FMS loans (66:95). The proposed credits to the ROK in Fiscal Year 1986 total \$228 million (66:95).

U.S. Benefits. In supporting U.S. regional objectives and defense strategy, the U.S. receives certain tangible benefits. The following advantages stem from the U.S. partnership with South Korea:

1. Increased standardization and interoperability of equipment;
2. Assurances for retaining access, overflight privileges, and base rights;
3. A strengthened U.S. defense industrial base;
4. Larger production runs and economies of scale to meet the needs of U.S. forces;
5. The creation of jobs and the stimulation of the U.S. economy (70:83-84).

In addition, South Korea has become an important trading partner of the U.S. In 1983 the bilateral trade between the two countries amounted to over \$12 billion, which represents an increase in trade of 4000 percent over the 1963 level (74:17). This level of trade makes South Korea the ninth largest trading partner of the U.S. and the sixth largest market for U.S. exports (74:17). This foreign exchange also "contributes to more favorable balance of payments accounts" (58:15). Clearly, the ability of South Korea to remain free and independent is of tremendous importance to the U.S.

U.S. Conventional Arms Transfer Policy

In keeping with U.S. policy and objectives to insure ROK security and strengthen its self-defense capability, the arms to be sold through FMS take on a significant role. Each successive administration determines the types of weaponry and the level of sophistication that is appropriate to

sell foreign nations based upon the administration's stated objectives.

The Carter Administration. The sale of different levels of sophistication of weapons to FMS customers became a controversial and primary issue under the Carter administration. In May 1977, President Carter announced his policy of restrained conventional arms sales. In this statement of policy, President Carter presented his rationale:

Each year, the weapons transferred are not only more numerous, but also more sophisticated and deadly. Because of the threat to world peace embodied in this spiralling arms traffic; and because of the special responsibilities we bear as the largest arms seller, I believe that the United States must take steps to restrain its arms transfers (56:1).

President Carter further clarified his approach to arms transfers in six major points.

1. The dollar volume of new commitments for FMS would be less, in constant dollars, beginning in Fiscal Year 1978 than they had been in the previous fiscal year.

2. The U.S. would not be the first supplier to introduce an advanced weapon system into a region if that system had the potential to create a significantly higher combat capability. In addition, these systems would not be sold until they were operational and in the U.S. inventory.

3. Advanced weapons, developed strictly for export, would not be permitted.

4. Coproduction agreements between the U.S. and other countries involving significant weapons, equipment, and components would be prohibited.

5. Transfer of U.S. weapons or equipment to third parties would not be allowed without U.S. approval.

6. State Department policy level authorization would be required for actions by agents of the U.S. or commercial vendors that might promote arms sales (56:2).

These six controls were considered "binding unless extraordinary circumstances necessitate a Presidential exception," or where determined "that countries friendly to the United States must depend on advanced weaponry to offset quantitative and other disadvantages in order to maintain a regional balance" (56:1).

It is important to note that, in the absence of an exception to this policy, President Carter specifically banned the sale of advanced weapon systems to FMS customers. In time, this particular policy required modification in the face of real-world politics. It became obvious that many countries would seek a more advanced aircraft than the bulwark of the FMS program, the F-5. In November 1979, the Secretary of State together with the Secretary of Defense requested from President Carter a decision on the development of an intermediate export fighter (13:8). They believed that an intermediate aircraft supported national security objectives and also supported "President Carter's arms transfer restraint policy by providing an alternative to the sale of front-line United States aircraft" (13:9).

President Carter agreed and his modified policy took effect in January 1980. He thus allowed commercial

contractors to develop an intermediate fighter aircraft for sale through FMS.

The purpose of this program was to constrain arms sales and reduce external political pressures for the sale of front-line fighter aircraft by providing lower cost, modern fighter aircraft alternatives, thus limiting the transfer of critical technology of the latest developed weapon systems. These aircraft were to be sufficiently limited in capability as to be 'nonprovocative,' yet they were to be more easily absorbed by the purchasing country and capable of defending the recipient country from its expected air threat in the 1990s (13:9).

This intermediate fighter development became known as the FX program. Thus, President Carter had established a classification of weapons that differentiated among developed, intermediate, and advanced weapon systems.

The Reagan Administration. President Reagan has pursued a different approach to conventional arms transfers than did his predecessor. On July 8, 1981 he signed a directive that promoted arms sales as an integral element of U.S. foreign policy and defense strategy (53:62).

The Reagan administration has modified five of the six points of the Carter policy. President Reagan removed the dollar restriction on arms transfers, eliminated the ban on development of export-only systems, removed the restriction on the introduction of advanced weaponry into a region as well as the requirement for a system to be in the U.S. inventory, issued instructions to U.S. embassies to provide limited assistance to commercial vendors marketing their systems, and ended the ban on coproduction agreements (67:3).

However, the essential elements of the sixth control established by Carter have been retained. The International Traffic in Arms Regulation (ITAR) requires advance authorization from the State Department before industry presents marketing proposals to foreign nations for significant military equipment in excess of \$14 million, or before entering into manufacturing licenses, or technical service agreements (18:47703). NATO nations, Australia, Japan, and New Zealand are exempt from this requirement (18:47704).

For the most part, the classification scheme that arose during the Carter administration remains intact, but the policy regarding it has changed. In place of President Carter's strong restraint on FMS sales is the Reagan administration policy that views arms transfers as an important element of U.S. national security.

It is a matter of record that the Reagan administration has approved the sale of the F-16 aircraft to selected FMS customers. Among the nations purchasing this aircraft from General Dynamics is the ROK. In fact, the ROK has ordered the F-16C/D, the front-line U.S. tactical fighter aircraft, which is the most advanced system currently available to the U.S. Air Force.

In deciding whether or not to allow the sale of a weapon system, particularly the most advanced ones, the administration reviews the needs of each country on a case-by-case basis.

The United States seeks to offer our friends and allies military aircraft that are appropriate to the particular threat to their security. Some countries face hostile neighbors, well armed with sophisticated weapons possibly provided by the Soviet Union; others have friendly, lightly armed neighbors; and for still others, the primary military requirement is internal security. In each case, a different type aircraft or perhaps none at all, may best meet a country's security needs (13:25).

The U.S. faces additional considerations in assessing the request of a foreign government for a weapon system. These include "the capabilities of particular countries to afford and absorb different aircraft," the country's technical ability to operate and maintain the system, and the effects on regional stability of selling one type of weapon over another (13:25-26). Additional guidance is provided in the Security Assistance Management Manual, prepared by the Defense Security Assistance Agency:

It is easier to approve the sale of less, rather than more, sophisticated equipment; easier to approve the sale of less, rather than more, expensive equipment; easier to approve the sale of equipment adopted by the U.S. forces and promising to the buyer the benefits of logistics standardization (16:6-4).

Although the Reagan administration arms transfer policy maintains that the intermediate fighter is the most appropriate level of sophistication to be sold to many FMS customers, no FX aircraft have been purchased. In fact, since 1980, the U.S. has "sold over 1100 fighter aircraft, other than FX, to 29 different countries" (13:14). This trend raises serious questions about the impact of the sale of different levels of sophistication to foreign nations.

The Trend Toward Sophisticated Systems

The Reagan administration has promoted the sale of the FX intermediate aircraft. It has encouraged foreign officers to receive briefings and fly the FX, and also has encouraged contractors to market the system. In fact, the U.S. government has made exceptions to national disclosure policy for manufacturers to brief the FX in international markets. Additionally, U.S. embassies have discussed the benefits of the intermediate system with nations hosting military bases (13:14).

Although the U.S. is actively promoting the sale of the FX, foreign governments have shown little interest in purchasing an intermediate weapon system. There are a number of reasons that the FX has been overwhelmingly rejected.

Many countries reject the aircraft because they have not been included in the current U.S. Air Force inventory. Some countries also reject the aircraft because FX is perceived as something less than 'first class' by virtue of the promulgated design limits. In addition, sales of foreign produced aircraft (such as the Tornado, MIRAGE F-1 and 2000 and the MIG-23) compete for the same market and, in some cases carry substantially more concessionary financial conditions (13:11).

Furthermore, the FX was developed to provide a significant cost savings to FMS customers facing serious budget limitations. However, this cost savings did not materialize as anticipated. The 1984 unit cost of an F-20 aircraft was estimated to be \$14.5 million, while the estimated unit cost of the F-16A was \$16 million and of the F-16C was \$17.9 million (13:71).

In the customer's eyes, the issue became: since cost differences are relatively insignificant, why not order the aircraft and capability of primary choice (13:63)?

Thus, the advanced weapons have become the systems preferred by FMS customers, and although the administration's policy encourages the sale of intermediate-type systems, realities force tough decisions about the level of sophistication that must be sold and complicate the management of these FMS transactions.

Summary

The U.S. Foreign Military Sales environment is continually evolving. There are national security interests and defense strategies which must be implemented and must reflect the changing world situation. U.S. objectives in this context are influenced, to a great extent, by the administration in office and the policies it maintains. Even though the Reagan administration has developed a specific policy addressing the sale of different levels of sophistication to be sold to FMS customers, events throughout the world shape and influence the decisions that the U.S. government must face in determining the level of sophistication to sell and what is in the best interests of both nations involved in any FMS transaction. These decisions, in turn, force specific challenges upon the managers of FMS transactions and complicate their ability to fulfill established objectives of the sale.

III. The South Korean Environment

Given its proximity to the USSR, mainland China, Japan and North Korea, the relatively small South Korea has a strategic significance well beyond its size. Ever since the three-year Korean War (1950-1953) ended in an armistice, the governments in both north and south have operated on a belligerent, semi-wartime footing (43:III-1).

It can be clearly seen that the sale of arms involves two nations--supplier and buyer. The focus upon the factors shaping the buyer's decisions are equally as important as the environment surrounding the seller. South Korea, as the recipient nation, is composed of a complex web of factors influencing its decision to purchase various weapons, and in turn, forcing a management challenge upon the seller, the U.S. Therefore, it is crucial to develop an understanding of these factors shaping the Republic of Korea.

Political Factors

The South Korean government is a republic that centralizes power in a strong executive, but consists of the conventional three branches as displayed in a simplified representation in Figure 2: Executive, Legislative, and Judicial. The constitution was written in 1948 and has been subsequently amended in 1962, 1972, and 1980 (43:1). "The constitution guarantees all citizens of the Republic, regardless of sex or religion, equality before the law, personal freedom, basic human rights and participation in government" (54:4). Yet this constitution represents "an

uneasy mixture of democracy and autocracy . . ." (30:158).

The president, who is elected by the National Conference for Unification for a term of seven years, is clearly the strongest and most influential actor in the ROK government. This fact has been the source of a troubled political environment.

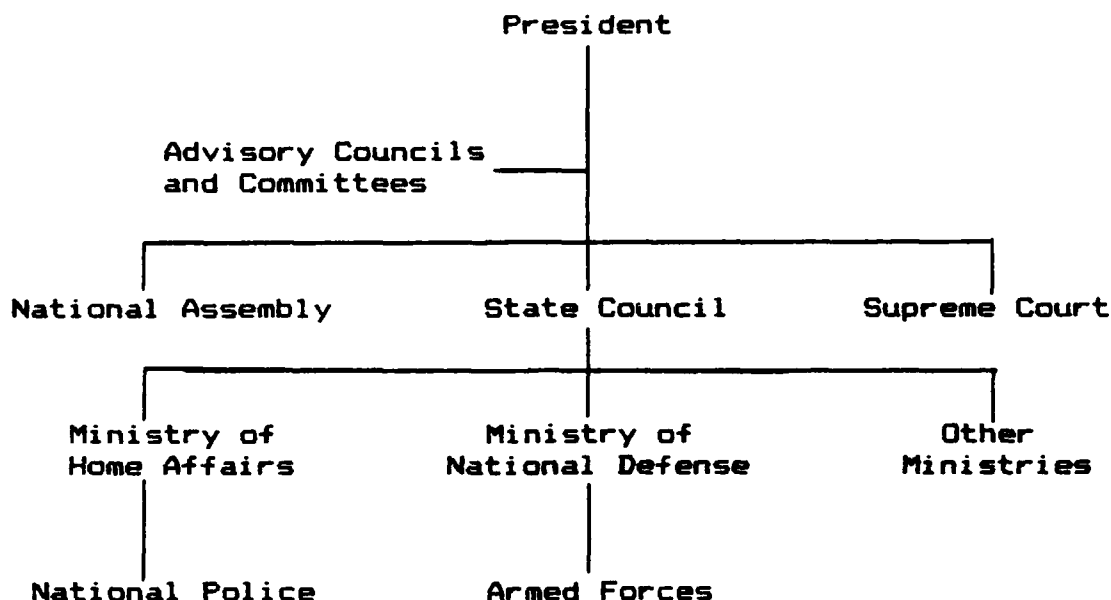


Figure 2. Structure of the South Korean Government (62:168)

On May 16, 1961 the democratic government was challenged when a military coup, led by Major General Park Chung Hee, captured the capital of Seoul and seized control of the government (30:182). This military action was "a non-Communist, even anti-Communist, reaction to what some soldiers considered the loose controls, corruption, and lack of progress of the Democratic regime [under President Yun and Prime Minister Chang]" (30:182). Under President Park, the power of the executive became virtually unconstrained.

A greatly amended constitution was ratified by national referendum in December 1962. This constitution provided for a strong president who could appoint and dismiss the Prime Minister without legislative approval. Additionally, it weakened the power and reduced the size of the legislature (30:187). The constitution was also changed in 1972 to permit the president to hold office for life (65:4). These amendments placed Korean democracy in a very tenuous position.

President Park ruled with a very heavy hand and extremely tight discipline until his assassination in October 1979, at which time Prime Minister Choi Kyu Ha assumed the presidency. This period was marked by political unrest and domestic chaos, and as a result, retired Major General Chun Doo Hwan was elected president in September 1980 (65:5). Under President Chun a new constitution was adopted which slightly diminished presidential power by limiting him to a single seven-year term. Elections, provided for in the new constitution, were held in early 1981, and President Chun was elected for the seven-year term (65:5). When his term expires in 1988, President Chun has pledged to relinquish his power to a successor (65:5).

In recent years, South Korea has undergone some liberalization of policies, though power remains concentrated in the executive. Chun removed martial law in 1981 and has permitted some political activity. He has freed or reduced the sentences of political prisoners, including releasing opposition leader Kim Dae Jung in December 1982 (65:5).

Despite this gradual easing of the authoritarian tendencies, political difficulties continue to plague the ROK. The country has been jolted by the return from U.S. exile of opposition leader Kim Dae Jung in February 1985. Kim's arrival was met by government authorities who immediately placed him under house arrest, thus testifying to the ongoing political rivalry between Kim and President Chun (71:36). Four days after Kim's return, National Assembly elections were held and Kim's antigovernment New Korea Democratic Party (NKDP) won twice as many seats as anticipated (72:61). President Chun's Democratic Justice Party barely retained its majority with 35 percent of the popular vote as compared to 29 percent of the vote captured by the NKDP (61:36). Although the long-term ramifications are unknown, it was clearly a personal setback for President Chun and a signal from the voters of dissatisfaction with Chun's political repression (72:61).

Summary. What is significant about South Korea's political environment is well documented. The ROK government is marked by instability and change; it is subject to the authoritarian rule of a strong president; and it is faced with credible opposition. Furthermore, it appears likely that these political disruptions will continue to affect South Korea for many years to come.

Economic Factors

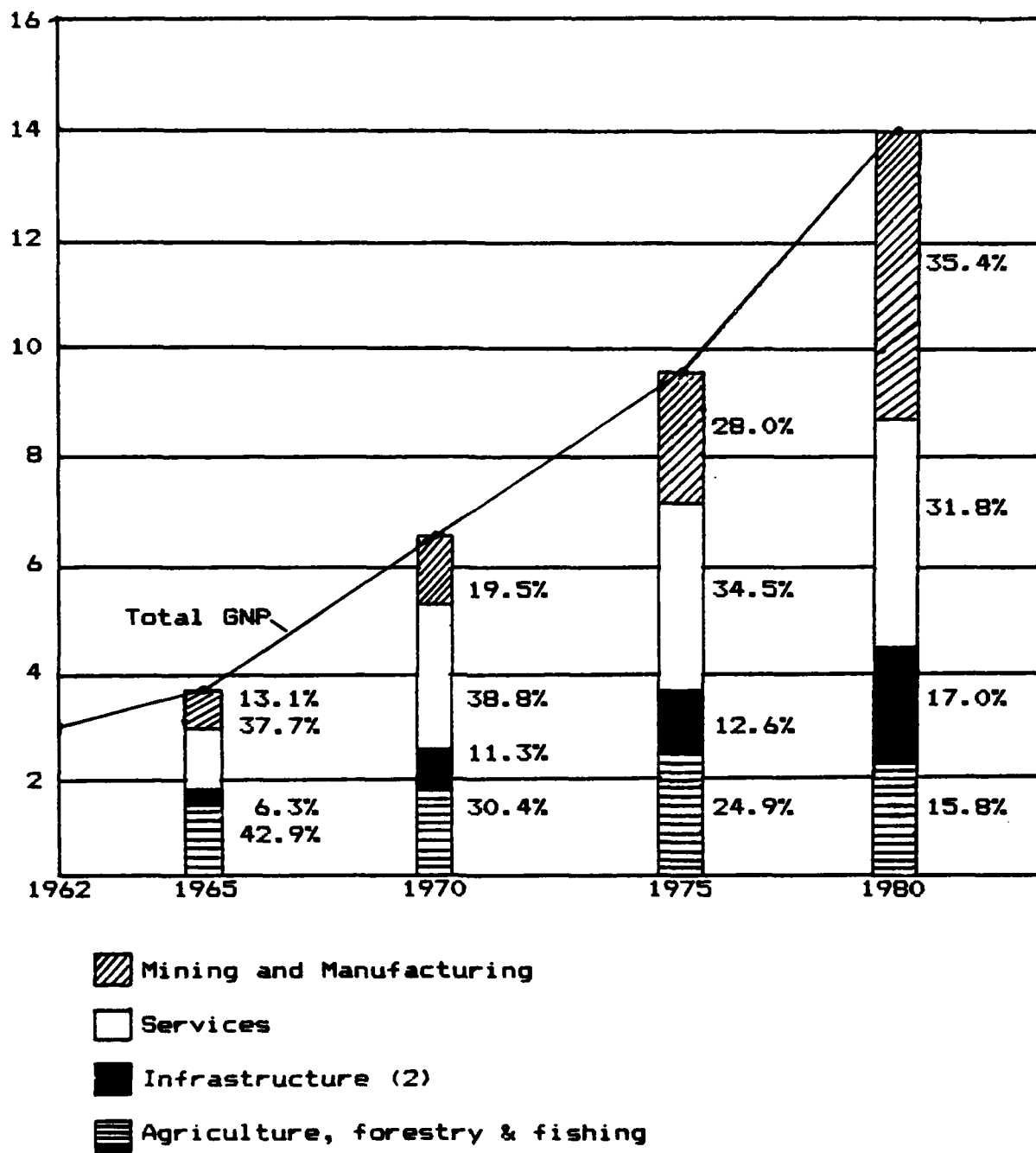
Over the past 20 years, South Korea's economic growth has advanced it from one of the world's poorest nations to

the brink of full industrialization (65:5). During the period from 1963 to 1978, real Gross National Product (GNP) increased at an annual rate of almost ten percent (65:5). However, in 1980, the ROK experienced a real negative growth rate of 5.7 percent and a decrease in the per capita GNP from \$1,594 in 1979 to \$1,508 in 1980 (54:6). This decline was triggered by the assassination of President Park and the subsequent civil unrest, increasing oil prices, and world-wide recession (54:6). By 1982, the per capita GNP had risen to \$1,680, and the ROK economy showed signs of full recovery (65:1). Economic planners have also "shifted their emphasis from high to stable growth," thus indicating a maturing of the South Korean economy (65:6). The economic indicators presented in Figure 3 illustrate the growth and strength of the ROK economy.

The South Korean government has emphasized economic development. In fiscal year 1981, for example, fully 20 percent of the national budget was earmarked for economic development (54:9). In 1982, social overhead capital and services constituted the largest share of the GNP at 46.5 percent, but the manufacturing and mining industries are close behind, representing 35.3 percent of the GNP (65:1). Agricultural products, primarily rice, barley, vegetables and fish, account for the remainder.

Although the ROK is attempting to expand its exports, it continues to import more products than it sells abroad. In 1983, imports were valued at \$24.9 billion and exports

100 billion won (1) (1975)



(1) Adjusted for inflation and converted to 175 won using the GNP deflator

(2) Includes public works, construction, transportation and communications services

Figure 3. The GNP as an Indicator of ROK Economic Growth and Strength (62:113)

at \$23.2 billion (22:531). Major products imported by the South Koreans include crude oil, which accounts for nearly 25 percent of the total dollar value of imports; grains, machinery, chemicals, and transport equipment (65:1). The major suppliers of these imports are Japan, the U.S. and Saudi Arabia (54:11). On the export side; textiles, transport equipment, metals, electronics, footwear, and fish are the main products sold by the South Koreans. These are purchased largely by the U.S., Japan, Middle East countries, and Europe (65:1).

ROK exports and imports are greatly influenced by available natural resources, which present an ongoing challenge to the South Koreans. The division of north and south left the ROK considerably resource poor. The ROK has limited reserves of tungsten, coal, iron ore, limestone, kaolinite, and graphite, but no oil (65:5). This has made South Korea very dependent upon imported energy and has resulted in "difficulties in maintaining a balance between energy demand and supply during the nation's rapid economic development and industrialization" (54:7).

In recent years the ROK government has attempted to reform the financial sector, which has been the source of a number of scandals, and to restructure the industrial sector (7:190). They have focused on investment in high technology industries in an effort to move away from labor-intensive ones, and electronics is now one of South Korea's fastest growing industries and largest exporters (54:6).

Yet, despite economic reforms and laudable economic growth, the balance of payments remains a major concern. South Korea's foreign exchange debt continues to grow: in 1983 the ROK balance of payments was valued at -\$1.607 million (22:531). To reduce the balance of payments deficit the ROK government has implemented several policies including price stabilization, increasing savings, improving the ROK's competition in international markets, and limiting investment in domestic projects (8:203). In addition, the economic planners have developed a significant program to build nuclear power plants in order to reduce South Korea's dependence upon imported oil (65:5). The first nuclear power plant began operation in 1978. Currently there are three plants operating and the ROK plans to have 12 nuclear power plants functioning by 1991 to provide 41 percent of the nation's electricity requirements (22:542).

Summary. The economy of South Korea is rapidly approaching that of a fully industrialized nation. It is becoming self-sufficient and more sophisticated. However, it continues to rely heavily upon imports to meet all of its domestic needs and is actively seeking ways to reduce this dependence.

Social Factors

The Republic of Korea consists of 38,000 square miles of mostly rugged, mountainous terrain (ei:1). It is about 120 miles east of Japan, and is bordered only by North Korea with the Military Demarcation Line (MDL) separating North from South. The Demilitarized Zone (DMZ) extends for

just over one mile on either side of the MDL (65:3). The capital of South Korea, Seoul, is located less than 30 miles from the DMZ along the western coast.

The east coast and central interior regions are the most mountainous, and good harbors exist only along the western and southern coasts (65:3). Only about 15 percent of the land is plains, which are generally small in area and isolated from each other (68:33). The majority of the population is located in these lowlands, especially in the northwest around Seoul and Incheon and in the plains of the southern part of the country. In 1983 the population of South Korea was approximately 40 million with an annual growth rate of 1.6 percent (65:1).

Transportation and Communication. The major transportation routes lie along the east and west coasts, though modern technology has permitted routes through the mountainous areas. The railroads are government-owned and carry about 47 percent of the cargo traffic and under 25 percent of the domestic passengers (62:135). The focus of the rail system is Seoul and principal routes radiate from the capital linking other major cities throughout the nation, including Incheon, Taegu, Pusan and Kwangju (68:45).

Road transport is the principal mode accounting for nearly three-quarters of the passenger traffic and 61 percent of the total tonnage of cargo (62:135). South Korea has constructed many new superhighways, though most of the nation's roads are poorly maintained and as of 1982 only 35.7 percent of all roads

were paved (22:542). For the most part, road travel is often slow and at times dangerous.

The ROK has 127 airfields of which 117 are usable, and of these, 62 have permanent surface runways (43:I-1). The privately-owned airline, Korean Airlines, serves international routes at Pusan-Kinhae and Seoul-Kimpo International airports (7:191). However, air transportation remains relatively insignificant in terms of domestic passenger and freight traffic.

Coastal shipping accounts for little over 25 percent of freight traffic (68:46). The main port is located at Pusan with several other major ports handling cargo including Inchon, Ulsan, Mukho, and Pohang (22:542). The physical cargo-handling facilities are, in general, poorly managed and inefficient (68:46), though port capacity is being increased, the shipping fleet is growing and facilities are undergoing improvement (22:514). The vast majority of foreign trade tonnage is also carried by ship.

South Korea's communication system is good and in the process of being upgraded and modernized. The ROK has some three million telephones and direct-dial service is available to the major cities (7:191). The television and radio network provides widespread coverage and several major daily newspapers are available (8:191).

Societal Structure. The family unit is the foundation of Korean society. This stems from Confucianism which emphasizes a hierarchy of social order and a family-centered code of ethics (68:190).

Anthropologist Vincent S.R. Brandt, writing about a rural village in the late 1960s, states that 'religion, value systems, productive activity and economic transactions, personality development, authority structures, social control and relations between villagers and the outside world are all inseparably entangled with kinship structures--either as they are conceptualized in ideal form or as they are manifested in actual institutions and behavioral situations. Loyalty to the kinship organization and obligations to relatives have priority in the formal value system over most other claims on a person's allegiance or resources' (68:82).

This characterizes the importance of the family structure, which dominates all facets of Korean life including business and government. Confucian values, which contain an element of authoritarianism continue to influence modern Korea.

Confucianism

has as its ideal a society in which each individual is aware of his relative position, fulfills his obligations to his superiors with obedience and respect, and recognizes his responsibility to treat his inferiors with justice and benevolence. Abstract and absolute determinations of what is right and wrong are not deemed as important as the maintenance of proper social relations (68:102).

At the same time, modern society has also undergone changes, due partly to the introduction of Western values and influences. Among the urban middle class, the attitude toward family size has shifted toward smaller families, the age at which people are marrying has increased, arranged marriages have declined dramatically, and the status of women has improved though discrimination still exists (68:102).

Although these and other reforms are shaping Korean society, the Confucian ethic remains at the heart of social and political values.

Summary. The geological structure of the ROK has impacted its social structure. It has forced the population into plains areas, complicated transportation, and provided a shortage of natural resources. Further, the South Koreans depend heavily upon rail and road transport to move their cargo and passengers. Finally, the society is rooted in the Confucian ethic, which places great emphasis upon the family structure and a social hierarchy. All of these factors influence and shape South Korea's needs and decisions including, of course, defense requirements.

Military Factors

In 1983, six percent of the GNP which amounted to one-third of the national budget, was spent on defense (43:8). Total armed forces includes about 600,000 active members (65:1). The South Korean army is by far the largest of the military services and exerts the most political influence; the air force is the youngest and the smallest of the ROK services.

The ROK Army is composed of two combat armies, the 1st and the 3rd, and one administrative army, the 2nd. The 1st Army guards the eastern half of the DMZ, the 3rd Army protects the western portion, and the 2nd Army defends the southern areas of the country as well as performing various administrative functions (43:I-2). The Army is organized along the lines of the U.S. Army.

The South Korean Navy is a relatively small, coastal defense force. It possesses ships no larger than destroyers,

and many of these are vintage U.S. World War II vessels (43:I-2). The ROK Navy emphasizes light, fast attack and patrol boats to guard against infiltration (62:230). Naval bases are located at Chinhae, Cheju, Mokpo, Mukho, Pohang, Inchon, and Pusan (43:2).

The smallest service is the ROK Air Force which operates primarily three squadrons of F-4's, four squadrons of F-5's and two squadrons of aging F-86's, as displayed in Table I (43:IV). In 1986, F-16's will be introduced into the ROKAF. There are several main air bases: Taegu, Kwangju, Suchon, Kunsan, Osan, Suwon, Chongju, and Kangnung (62:228), and the ROKAF materiel depot is located at Taegu (68:355).

Arms Production. South Korea is currently developing an indigenous weapons production industry as part of the Force Improvement Program. Professor Young-Sun Ha of Seoul National University breaks the development of the ROK defense industry into four distinct phases. This development is establishing South Korea's position as a major arms producer and exporter among developing nations (26:225).

The first phase (1968-1971) began with President Park's decision to build munitions factories in response to a North Korean attack on the presidential mansion (26:225). This proved to be only the beginning of the ROK weapons industry. After President Nixon announced in 1969 his plan to reduce the number of U.S. troops stationed in South Korea, President Park felt a strong need to develop a range of defense

TABLE I

Aircraft in the ROK Air Force as of December 1984

Category	Type	Number
Fighter:	F-5 A/B/E/F	260
	F-86F	70
Air Defense:	F-4 D/E	72
Counterinsurgency:	OV-10, A-37	24+
Reconnaissance:	RF-5A	10
Search and Rescue:	UH-1H	6
	UH-1B/H	20
Transport:	C-54	10
	C-123 J/K	16
	HS-748	2
	C-130H	6
Trainer:	T-28D	20
	T-33A	33
	T-37C	39
	T-41D	20
	F-5 B/F	98
		(45:144)

During the second phase (1972-1976), ROK expenditures for the research and development of weapon systems began a gradual steady growth as is depicted in Table II. Initially, the ADD chose ten basic systems for production such as hand grenades, mines, and small radio sets (26:225). The budding defense industry was aided by the enactment of the Provisional Law for the Promotion of Military supply which provided for economic assistance, guaranteed profits, and eliminated military service commitments for workers in these industries (26:227).

This phase also saw the implementation of the Force Improvement Program, which was intended to create a self-defense capability through ROK industries within four to

TABLE II

ROK Defense Expenditures by Appropriations Category
(Current Million Won)

Year	Personnel	Maintenance	R&D	Investment	Total
1961	12,743	2,948	---	896	16,587
1962	16,774	2,867	---	831	20,472
1963	16,792	2,762	---	924	20,478
1964	20,795	3,191	---	940	24,926
1965	24,643	3,923	---	1,306	29,874
1966	31,953	7,001	---	1,588	40,542
1967	35,559	10,377	---	3,569	49,504
1968	44,914	13,302	---	6,472	64,708
1969	55,780	17,457	---	11,146	84,383
1970	69,073	22,968	---	10,295	102,336
1971	81,825	38,217	341	14,365	134,748
1972	96,987	55,500	2,054	19,097	173,638
1973	108,131	60,391	2,137	12,971	183,630
1974	144,107	123,153	8,234	21,348	296,842
1975	208,720	141,169	12,726	79,854	442,439
1976	298,920	170,975	36,035	197,818	703,748
1977	393,301	234,943	36,224	285,165	949,624
1978	483,557	336,539	30,878	483,379	1,289,353
1979	592,828	451,776	45,389	436,868	1,525,861
1980	792,401	751,607	70,751	642,624	2,257,383
1981	n.a.	n.a.	n.a.	n.a.	2,689,919
1982	n.a.	n.a.	n.a.	n.a.	3,179,944
1983	n.a.	n.a.	n.a.	n.a.	3,189,074*
1984	n.a.	n.a.	n.a.	n.a.	3,386,217*

* estimated totals

(26:226 and 22:5:29)

five years' time (26:227). President Park sought to have critical defense industries operating by 1979 and to "raise raise them to a world-class level early in the 1980s with the exception of highly sophisticated electronic equipment, high-technology fighter aircraft, and nuclear weapons" (26: 227).

In 1977 President Carter announced that U.S. troops would be withdrawn from South Korea within five years; this precipitated President Park's decision to increase the development of its weapons industry and marks the beginning of

the third phase (1977-1981). The ROK, under the direction of the ADD, began developing and producing highly sophisticated weapon system like surface-to-surface missiles (26:228). It also began efforts to produce a sophisticated aircraft through a coassembly program of the Northrop F-5E/F fighter, though the U.S. government rejected a proposal to coassemble the F-16 (26:228).

In this third phase, the defense industries reached a production level at which many of South Korea's weaponry needs were being met, and new markets were sought to allow production lines to continue operating (26:229). "However, as the United States continued to tightly control the export of military hardware through U.S. assistance to third countries, the operation rate of the South Korean defense industry rapidly declined in this period" (26:229).

The fourth phase began in 1982 and is programmed to continue through 1986 under the second Force Improvement Program which was implemented despite President Reagan's decision to keep U.S. forces in South Korea (26:229). This Force Improvement Program is intended to upgrade the ROK forces through the indigenous industries and U.S. Foreign Military Sales. President Chun is now seeking the local development of high technology weapon systems (26:229). The first coproduced F-5 was successfully tested in September 1982 and 20 percent of the aircraft's parts were ROK manufactured. By the time the F-5 coassembly is completed in 1986, the South Korean's goal is to be manufacturing 75 percent of the aircraft's parts (26:231).

Despite growing ROK self-sufficiency in arms production, the U.S. government continues to restrict the sale of South Korean weapons, produced with U.S. technology, to Third World nations. The U.S. is, however, seeking policies which will permit these sales without endangering U.S. policy or degrading the U.S. industrial base (26:231). South Korea will also shift its focus from weapons that copy U.S. systems to the development of weapons that are better-suited for Korean conditions, thus improving combat effectiveness and avoiding potential export controls (26:231). It is certain that the South Korean defense industry will continue to expand in the coming years and will locally produce a continually increasing amount of weapons.

Arms Purchases. South Korea's FMS purchases are directed at fulfilling one or more of these intended goals: modernization of forces, self-sufficiency, the growth of advanced technology, and security. The goal of ROK force modernization has been very clearly demonstrated by the implementation of the Force Improvement Program (FIP). The FIP "emphasized increasing modern fighter aircraft and anti-tank capability; improving the tank force, air defense, and logistics . . ." (62:214). Details of the FIP are classified; however, it is known that the "ROK's Force Improvement Plans (FIP) have been used to upgrade the quality and capability of its armaments and to improve the managerial and technical competence of its military personnel" (66:93).

Self-sufficiency in weapons production, as previously discussed, is a major objective of the FIP. The second FIP emphasizes

the development of the indigenous arms industry in order to staunch this outflow of money from the country. Currently more than 2 percent of the ROK defense budget is spent in the U.S. (43:III-2).

The South Koreans attempt to locally produce all unsophisticated military items.

Where the technical expertise is not present or where production runs of expensive items would be too short to justify setting up production facilities, coproduction has been sought (43:III-2).

Coproduction efforts help to keep money in the ROK economy and enhance the Koreans' effort to achieve their goal of self-sufficiency in weapons production.

The goal of obtaining advanced technology is related to the desire for self-sufficiency. South Korea recognizes that it will be unable to produce highly sophisticated weapon systems without an inflow of Western technology. As discussed in Chapter I, the demand for sophisticated weaponry is growing, and South Korea has joined those nations who are purchasing the most advanced weapons available. However, beyond simply purchasing these systems, and in order to educate the technical and production base, coproduction has become an important method of transferring technology and technical capability. The level of technology transfer "is an absolutely essential determinant for dictating the rate and complexity of Korean technological advancement in the aircraft industry" (76:70). Further, "the more extensive

the transfer of advanced technology the more valuable the spillover effect will be to R.O.K. industry" (76:171).

Clearly, obtaining advanced technology is crucial to the ROK if they are to develop the capability for producing sophisticated weaponry. This capability will allow them to achieve the goal of self-sufficiency as well as strengthening the ROK economy by reducing the monetary outflow from purchasing weapons abroad and by increasing the monetary inflow through arms sales to Third World nations. Dr. Neuman of Columbia University summarizes:

Today's advanced military technology is tomorrow's intermediate-level weapon system, and through a network of licenses, offsets, and joint ventures, today's buyer is often tomorrow's producer (46:27).

Finally, the arms that South Korea purchases must fulfill a defense need. This is the fourth, and perhaps most important goal; that of national security. Clearly weapons are procured in order to deter the threat facing the nation. It must, therefore, be recognized that insuring the national security is a very primary motivation behind the ROK's purchases of weapon systems.

The Threat. "The security threat facing South Korea is quite real" (74:16). North Korea continues to pose an imminent danger to the peace and stability of the south, as evidenced by a number of recent events. The most prominent event in recent years was the bombing, directed at President Chun, in Rangoon, Burma on October 9, 1983. Although President Chun escaped harm, 16 high-level South Korean officials were killed (64). Evidence found amid the ruins pointed at

North Korea: two North Korean claymore antipersonnel mines were discovered, one of which was unexploded; several armed North Koreans were captured in the area of the bombing during the following two days, and port calls by North Korean ships at Rangoon were suspected of having brought the terrorists to Burma (63:88).

Border clashes along the DMZ are a common occurrence. In 1983, North Koreans attempted to infiltrate ROK territory on June 19, August 5, August 13, and December 3, which resulted in the death of at least ten North Koreans and the capture of two (40:148). In September 1983, a small bomb blast at the U.S. cultural center in Taegu was believed to be the work of North Korean infiltrators (63:88). A shooting in November 1984 illustrates that hostilities continue.

A group of Soviet visitors followed their Russian guide...on a tour of Pyongyang's side of the armistice line. Suddenly a member of the party broke away and ran across the border. Nearly 30 North Korean troops followed him, firing their weapons frantically. South Korean and American soldiers guarding the southern side of the zone returned the fire. When the shooting was over, at least two North Koreans and one South Korean was dead, an American GI was wounded--and the Russian, unhurt, was in the custody of United Nations Command officials (31).

The violence directed at the south by North Korea coincides with their persistent military build-up. Over 20 percent of North Korea's GNP is spent on its military (74:16) as compared to the six percent spent by the ROK (65:1).

North Korea

maintains a standing army of 800,000 men, including the largest commando forces in the world. The North fields twice as many maneuver battalions, armored

vehicles, and tanks as the South. Along a front only 120 miles wide, the North fields three-fourths as many artillery pieces as the U.S. Army has worldwide (74:16).

The North Korean advantage over combined ROK-US forces also includes a two-to-one advantage in combat aircraft and a nearly four-to-one edge in ships (40:149). Although North Korea's population is only fortieth in size in the world, its military ranks sixth (40:149). Table III offers a comparative summary of the military strength present in the North and the South. This large military establishment presents a very real and significant threat to South Korea.

Summary

This, then, establishes the South Korean environment that is at the heart of the nation's decisions on weapons purchases. Undoubtedly, political, economic, social and military factors all play an important role. As the Assistant Secretary of State for East Asian and Pacific Affairs, Paul Wolfowitz explains,

security, economic growth, political development, and sound international relations are four related problems. They are intertwined. Without a secure environment, political and economic progress are endangered. Without political and economic progress and strength, sound relations between countries, and the reduction of tension throughout the peninsula will never be achieved, or once achieved, be long sustained (74:16).

Thus, having examined the United States' FMS environment in Chapter II and the Republic of Korea's environment in Chapter III, this background now provides the framework for testing the thrust of this thesis: Given the backdrop

TABLE III

Comparison of North Korean and South Korean Military Forces

NORTH		SOUTH	
Population:	19,600,000	Population:	41,600,000
Total Armed Forces:	784,500	Total Armed Forces:	622,000
1984 Defense Budget:	\$2.038 bill	1984 Defense Budget:	\$4.315 bill
ARMY		ARMY	
Active	700,000	Active	540,000
Reserves	260,000	Reserves	1,400,000
Divisions	41	Divisions	58
Independent Brigades	14	Independent Brigades	16
Armored Vehicles	3,965	Armored Vehicles	1,700
Artillery	16,854	Artillery	7,932
Anti-tank	1,500	Anti-tank	58
Air Defense	8,000	Air Defense	276
Aviation	--	Aviation	314
NAVY		NAVY	
Active	33,500	Active	49,000
Reserves	40,000	Reserves	25,000
Submarines	21	Submarines	--
Destroyers	--	Destroyers	11
Frigates	4	Frigates	8
Fast Attack	361	Fast Attack	8
Patrol	63	Patrol	27
Landing Craft	107	Landing Craft	33
Minesweepers	--	Minesweepers	8
Anti-sub Aircraft	--	Anti-sub Aircraft	44
AIR FORCE		AIR FORCE	
Active	51,000	Active	33,000
Reserves	--	Reserves	55,000
Bombers	70	Bombers	--
Ground-attack	410	Ground-attack	330
Interceptors	260	Interceptors	--
Air Defense	--	Air Defense	72
Counter-insurgency	--	Counter-insurgency	24
Reconnaissance	--	Reconnaissance	10
Transports	272	Transports	34
Helicopters	60	Helicopters	26
Trainers	220	Trainers	210
PARAMILITARY		PARAMILITARY	
Special Forces	100,000	Civil Defense Corps	4,400,000
Security/Border Guards	38,000	Student Defense Corps	1,820,000
Civilian Militia	4,000,000	Coastguard Vessels	25
		Coastguard Helicopters	9

(45:143-144)

of the U.S. and ROK environments, is there sufficient evidence to indicate that FMS managers experience major and significant differences between providing South Korea with developed weapon systems and providing them with advanced ones?

Secondly, what are the implications of these management considerations given, again, the presented backgrounds of these two nations?

IV. The Management of Three ROK Cases Examined

An FMS case is an undertaking which requires concentrated management effort. Such an undertaking requires complex and interdependent organizational activities and requires that a case manager be designated as the single focal point (16:7-129).

This chapter examines the management of three ROK FMS cases: one developed system sale, Peace Freedom III, and two advanced system sales, Peace Voice and Peace Bridge. As a foundation, case management is defined and four management objectives of the sale are presented: (1) system performance, (2) cost, (3) schedule, and (4) logistics. Each of these ROK cases is then examined based upon these four management objectives and the ease or difficulty with which managers fulfill them. At heart is the one key issue: Does the management of developed weapon system sales differ significantly from the management effort required to successfully accomplish advanced system sales?

Case Management

An FMS case is "a contractual sales agreement between the U.S. and an eligible foreign country or international organization documented by DD Form 1513" (16:B-2). Simply put, it is a contract much like any other. It is a "mutually binding legal relationship obligating the seller to furnish the supplies or services (including construction) and the buyer to pay for them" (23:42107).

This FMS contract, the DD Form 1513, is better known as the Letter of Offer and Acceptance (LOA). The LOA specifically lists the items or services to be provided, the estimated costs, and all terms and conditions of the sale to the extent which they can be assigned. Naturally, the total cost and complexity of different FMS cases varies considerably (as can be seen in the cases examined in this chapter); however, whether more complex and more expensive, or simpler and less costly; "both require emphasis and special management attention (even a very low value case may involve many different functional activities), and both are managed in accordance with well-defined guidelines" (16:7-128).

This "special management attention" is provided by the case manager. The FMS case manager is

that individual who is designated to accomplish the task of integrating functional and inter- and intra-organizational efforts directed toward the successful performance of a Foreign Military Sales case (16:7-128).

The Security Assistance Management Manual (SAMM) outlines the role and responsibilities of the case manager. The case manager:

1. Serves as the focal point for all management activity on an assigned case;
2. Ensures the objectives of the case are achieved and applicable laws and regulations are followed;
3. Coordinates and integrates organizational actions and resources assigned to Security Assistance functions;

4. Plays a role in all major elements of the case (acquisition, programming, logistics, and finance); and
5. Is involved in every aspect of planning and execution of the assigned case (16:7-128).

As a general summary of the scope of the case manager's job, the SAMM presents the "Charter for the Case Manager."

The case manager has responsibility for total case management from assignment through case closure. The case manager operates within the chain of command to direct the necessary action to satisfy case requirements. The case manager ensures that the case (performance) is accomplished on schedule, within case value, and closed as planned. The case manager manages the case through reviews, visits, surveillance of reports, and correspondence. The case manager integrates the efforts and ensures timely resolution of problems surfaced by supporting activities (16:7-133).

This charter is not entirely unlike the charter for a contracting officer, and in many ways the case manager can be viewed as performing functions similar to one. Certainly the case manager is not a contracting officer, but similar responsibilities and obligations are evident with respect to administering contracts (LOAs). Within the Federal Acquisition Regulation (FAR) a contracting officer is defined as

a person with the authority to enter into, administer, and/or terminate contracts and make related determinations and findings. The term includes authorized representatives of the contracting officer acting within the limits of their authority as delegated . . . (23:42107) [emphasis added].

This notion is important to the case manager if he or she is to "follow applicable laws and regulations." The SAMM states,

When procuring for a foreign government, DoD will apply the same contract clauses and contract

administration as it would use in procuring for itself, except where deviations are authorized in the DoD FAR Supplement (16:2-4) [emphasis added].

Thus, in fulfilling requirements contained in the FAR, the case manager is faced with two important tasks. First, with regards to the LOA, the case manager is

responsible for ensuring performance of all necessary actions for effective contracting, ensuring compliance with the terms of the contract, and safeguarding the interests of the United States in its contractual relationships (23:42106).

Second, he or she is responsible for fulfilling the objectives of the contract (LOA). Subpart 7.105 of the FAR lists acquisition objectives for which planning must be accomplished including:

1. Costs of the contract;
2. Clarification of system capabilities or performance characteristics;
3. Delivery requirements; and
4. Logistics considerations (23:42125).

These federal government stipulations are echoed in DOD and Air Force publications. The SAMM requires that

all DoD components shall assure that FMS delivery commitments are fully coordinated, and that the material conforms to the standards on the LOA, and can be delivered in the agreed upon time period (16:2-5).

In addition to the performance, cost, and schedule terms, the SAMM requires that all FMS cases for major systems include "all complementing/supporting material and services . . ." (16:7-28).

Air Force Regulation 400-3, Foreign Military Sales, states that FMS weapon system sales must be managed in accordance with Air Force directives in the 800- series covering acquisition management (17:7-1). Current Air Force policy on acquisition management has taken the traditional objectives of cost, schedule, and performance, and added a "fourth wheel"--logistics concerns (55-122). Air Force acquisitions, and in keeping with established guidelines, FMS cases, must therefore seek to fulfill four coequal goals: providing specified system performance, at minimum cost, according to a stated delivery schedule, and with adequate logistics support. It is these four objectives or "management wheels" which will provide the basis for assessing the ROK cases presented in this research effort.

An important, although somewhat confusing note must be made. The responsibilities of the case manager may be, and frequently are, divided among "case functional managers" (17:A1-1). With the four case management objectives, "there are two main elements of Foreign Military Sales (FMS) Management; System Acquisition and Logistics Support" (32:1). These two elements drive the organization of FMS case management and result in case functional managers being assigned.

Typically, for cases involving large dollar values and great complexity, management requirements are delegated through the responsible service department, in this context the Air Force, to Air Force Systems Command for acquisition support and to Air Force Logistics Command for logistics

support. Air Force Systems Command delegates responsibilities to Aeronautical Systems Division (ASD) and the appropriate Program Office. Case managers are then designated within the Program Office with the primary objective of insuring "the delivery of a safe air vehicle within cost and schedule constraints" (32:4). The Program Office case manager will coordinate with the contractor for procurement, establish and control the configuration of the weapon system, monitor production and quality control, and technically evaluate systems (32:4).

For logistics support, the office of primary responsibility is the International Logistics Center (ILC) within Air Force Logistics Command. The designated case manager here is responsible for processing letters of request, obtaining data on system price and availability, monitoring case financial status and supply status, and managing follow-on support (48:3-13). All case managers must work and coordinate with Air Force authorities within the chain of command, with the appropriate Military Assistance Advisory Group, with representatives of the purchasing nation, and with country managers located at Air Logistics Centers who help to "tailor" and provide the necessary logistics support.

Although this multi-manager concept is common practice; smaller, less complex cases, in general, have fewer case managers and larger cases have more managers. Most importantly, the functions and responsibilities of case managers,

as previously discussed, govern all case managers within all organizations, and provide a complicating and contradictory fact to the concept of the case manager as the "focal point" for case activities. Each case functional manager (hereafter referred to simply as "case manager" or "program manager") thus becomes a part of a network of managers who must work together, integrating all aspects of the FMS case, in order to successfully fulfill the performance, cost, schedule, and logistics objectives specified in the LOA.

A Developed Weapon System Case: Peace Freedom III

The first ROK case to be examined involves the aircraft which has been the mainstay of U.S. Foreign Military Sales for many years--the Northrop F-5. The Peace Freedom III program is the third in a series of ROKAF F-5 purchases. Under Peace Freedom I the ROK purchased F-5E/F aircraft, and they bought the F-5F under Peace Freedom II. The current case, however, involves the coproduction of 68 F-5E/F aircraft, and therefore, it presents the ROK with the new challenges of coproducing a weapon system and, at the same time, reduces other complications since the F-5 is presently in the ROKAF inventory. The coproduction decision is consistent with the ROK's Force Improvement Program and its development of an indigenous aircraft industry.

A coproduction case differs somewhat from a direct FMS transaction. Under Peace Freedom III, the "ship sets," the

aircraft sections and components, are purchased by the ROK directly from Northrop (9). The FMS subcases contained in the LOA cover support materiel and services that are required to operate and support the aircraft (48:1-51). The ROK produces a few minor components in-country such as main landing gear doors and trailing edge flaps (49:79:1385B). Once produced by Northrop, the ship sets are delivered to the Korean Air Lines (KAL) coproduction factory in Pusan where they are assembled (48:1-51).

Under this arrangement, ASD manages

the FMS subcases for Government Furnished Equipment, recoupment of nonrecurring investment costs, quality assurance/audit expenses, engineering change orders, and peculiar support equipment. AFLC/ILC is managing the FMS subcases for standard/non-standard support equipment, production line support equipment, aircraft/support equipment spares and the technical assistance team (60).

Although ASD Peace Freedom III case manager, First Lieutenant Dan Bell states that as case manager he has limited involvement with the contractor concerning the ship sets themselves, on the ILC side of the transaction, it is viewed as a fairly typical case. In a memorandum, former ILC case manager Captain Forrest Smith wrote,

As far as AFLC is concerned there is no difference in supporting a coproduction effort then there is with any other major FMS system sale. We are mainly responsible for ordering and managing the spares and support equipment which will be used to support the aircraft after they are built (60).

Clearly, the coproduction effort presents some different challenges to the case managers, but it is also evident

that there is no such thing as a strictly "typical" FMS program.

Performance. There is little doubt that system performance and level of sophistication go hand-in-hand. Together they drive the management effort demanded by a particular case. Thus, to understand the specific management challenge involved, it is essential to establish basic performance characteristics and capabilities of the weapon system.

The F-5E single place and F-5F two-place trainer aircraft are low wing, supersonic, tactical fighters powered by two J85-GE-21B afterburning turbojet engines (32:7). They "retain most of the baseline features found in Korea's current [in inventory] F-5E/F aircraft" (48:1-1). The coproduction models, as compared to those F-5s from the previous purchases, possess slightly different radomes and pitot booms, improved handling qualities, and more advanced avionics systems (48:1-2).

At the time of sale, a standard delivery configuration was established. The Peace Freedom III Program Management Plan states,

Identification of the configuration will be accomplished by specifications, drawings, and other engineering documentation for the Peace Freedom III aircraft. A Korea peculiar configuration will be established (32:9).

The Integrated Logistics Support Plan (ILSP) describes these configurations which were established--116000D for the F-5E and 115000D for the F-5F (48:1-3).

In a detailed matrix, the ILSP compares the configurations of the two previously purchased ROK F-5 systems against the Peace Freedom III configurations. The table identifies 11 specific items which were changed as a part of and incorporated into the Peace Freedom III baseline (48:1:20). Thus, it is evident that a specific and detailed ROK FMS baseline was developed for the Peace Freedom III program that provided a clear description of the system to be managed and delivered.

According to ASD case manager Lt Bell, there has been only one engineering change proposal (ECP), since the LOA was signed, which has modified the ROK configuration. This modification was fleet-wide and, therefore, involved the standardization of F-5s throughout the world (9). Bell claims that most of the Peace Freedom III modifications were accomplished on the production line at Northrop, and for those F-5s already shipped to Korea for assembly, retrofit kits were provided free of charge (9).

The primary mission assigned by the ROKAF to the F-5E/F is air superiority, though it has alternate roles of interdiction, ground support, and of course, training (48:2-1). In an air superiority mission with the F-5E carrying one pylon tank and two AIM-9 missiles, the mission radius is 360 nautical miles, or carrying three pylon tanks and the two missiles, the F-5E has a radius of 570 nautical miles (47:2-8). This range provides the ROKAF with sufficient capability to meet any intruding aircraft within South Korean

borders, loiter for perhaps 20 minutes, engage in combat for some five minutes, and return to base (47:2-9).

As an air superiority aircraft, the F-5E/F has "instantaneous turn performance at maximum lift," since it was designed to emphasize dogfight scenarios (47:2-45). The F-5E/F possesses "excellent stability and control characteristics" as well (47:3-1). Finally, if used primarily in this air superiority role, Northrop estimates a service life of 8000 hours for the aircraft (47:4-20). All of these performance characteristics combine to form a system that utilizes early 1970s technology and is adequate for South Korea's defense needs (9).

Cost. The ROK faces severe budgetary constraints. Every case manager on every case examined in this research effort echoed the same theme--in managing the ROK cases, cost is a driving factor and a primary concern. Says Lt Bell, "They're very dollar conscious. They want to know where the money is and they want funds returned, when possible. Actions involving money can cause political problems" (9). Major Dave Abati, ASD case manager for the Peace Bridge F-16 program, agrees with Bell, "They are faced with 'austere funding constraints' and costs are politically sensitive" (1). This point is reiterated in routine memoranda and messages. "They are specifically concerned that the cost data should remain unchanged . . ." states the Military Assistance Advisory Group, Korea in one memo (37).

"ROKAF funding is extremely critical at the present time . . ." states another (36). It is clear that delivery of the system within LOA estimates is of great importance to the Koreans and that the consequences of hidden or increasing costs can be politically troublesome to them.

In recognition of these cost concerns, the Peace Freedom III program reveals remarkable success from a cost management standpoint. The value of the Northrop-provided ship sets was estimated at \$340,000,000 for the 68 aircraft (60). The FMS program handled by AFSC and AFLC was estimated at a total value of \$73,735,295 (32:21-22). Summing these figures, an average cost per unit for the 68 aircraft can be established at just under \$6.1 million per ROKAF F-5. This figure includes all administrative and support expenses.

In March 1982, the ROKAF requested an LOA amendment that would change the aircraft mix from 36 F-5Es and 32 F-5Fs to 48 F-5Es and 20 F-5Fs (33). The overall cost impact of this mix change was an estimated savings of \$1.18 million in the FMS cases (52). Overall, a reduction in total program expenses is expected. In 1984 the ROKAF requested a \$1.02 million reduction in the Peace Freedom III program, and AFLC identified areas with excess funds to allow HQ USAF to make this reduction effective in the 1986 payment schedule (52). ILC Peace Freedom case manager Jean Graham reveals that the ROKAF is now seeking yet another reduction in funding above the previous \$1.02 million (25). According to Lt Bell, some \$3.5 million was returned to the Koreans two years ago.

There has been shifting of funds between subcases, but no money has been added to the program since its inception (9). Essentially, the program has been adequately funded, has maintained a sufficient management reserve, has returned monies to the ROKAF, and is projected to return an additional \$1.02 million over 1986. States ILC manager Graham, "Overall, it has been a very well-run program with no money difficulties" (25).

Schedule. With the Peace Freedom III LOA, two delivery schedules were established. The first schedule set the deliveries of ship sets to Korean Airlines (KAL); the second delineated KAL responsibility to deliver to the ROKAF. Unquestionably, from an FMS management viewpoint, the first schedule is of critical importance and has direct impact upon the second schedule, ultimate delivery to the user. Both the USAF and ROKAF deem on-time delivery to be a key element of program success. In fact, the meeting of the scheduled 1982 delivery date for the first two F-5 aircraft ("F" models) was considered critical since it had "political implications for the Korean government" (60). In addition to delivering the system to the purchaser on a timely basis, "delivery schedules must be realistic so that support can be made available" (17:2-1).

Under this coproduction arrangement, it is very difficult for FMS managers to have much impact. Yet, the LOA places a certain responsibility upon case managers and the USAF for fulfilling some aspects of system delivery. Even

if Northrop, over whom USAF managers have very little influence, is responsible for a schedule delay, it reflects unfavorably upon the USAF which performs a central role in the transaction. Thus, the case managers have little control and can take little credit for the schedule, but face the uncomfortable situation of having to answer for and resolve any potential schedule slippages. Fortunately, the fulfillment of the delivery schedule has been an overwhelming success to date. Northrop has never missed a delivery date and aircraft delivery has, in fact, been running ahead of schedule (9).

The management tool for achieving on-time delivery is the program milestone chart. This document details all program phases and activities from the signing of the Memorandum of Understanding (MOU) to program completion. In order to "assess progress toward accomplishment of planned objectives," program reviews are conducted (32:17). These reviews include briefings on all facets of the program, identification of potential problems, and corrective actions to be taken (32:17).

Peace Freedom III program reviews have led to few action items, particularly since scheduled deliveries and activities have been well-managed. Deliveries of the F-5E/F are scheduled to conclude in 1986, and all indicators are that this will be accomplished without deviation, and quite possibly, ahead of schedule.

Logistics. Weapon system supportability is a broad concept encompassing many different concerns. Yet, logistics plays a very central role in the FMS transaction. The Security Assistance Management Manual expresses the concern of the U.S. government that,

FMS customers are aware of and are afforded the opportunity to plan for obtaining all necessary support items, training and services required to efficiently introduce and operationally sustain major items of equipment/systems . . . (16:8-2).

It further states that,

Normally, foreign military sales of materiel are made only when the DoD has made or approved plans to assure logistic support for the expected service life of the equipment (16:6-9).

Thus, systems sold through FMS are expected to be supportable, and it is the case manager's task to ensure that this support is provided in conjunction with system delivery.

The management of the logistics objective must include supply support, support equipment, facilities, manpower, and training. System reliability and maintainability will naturally affect these logistics areas and impact the management effort required. The case manager's role will also be a function of the complications which arise in fulfilling system supportability requirements. Thus, to understand the management effort required to fulfill these logistics objectives, reliability and maintainability must be addressed in addition to the specific support areas.

Recent F-5E/F reliability estimates demonstrated a mean flight time between failures of slightly under 3.5 hours,

and maintainability estimates indicated approximately 14 maintenance manhours per flying hour are required (13:74-75). Says ASD case manager Bell, "The F-5 is easily maintained" (9). This can be partly attributed to the system's relative simplicity. Northrop's aircraft description claims, "ease of maintenance is emphasized in the design" (47:4-1,2).

The ROKAF operates under a five-level maintenance concept with one level of organizational, two levels of intermediate, and two levels of depot maintenance (48:2-7). This maintenance concept drives the requirement for facilities to support the Peace Freedom III acquisition. The organizational and intermediate level maintenance facilities, located at the designated main operating bases, were "presumed by the ROKAF to be adequate for acceptance of the Peace Freedom III aircraft" (48:2-5). Similarly, extended depot level facilities were previously developed under the prior F-5 purchases. In fact, no formal site survey was necessary during the Peace Freedom III planning since a logistics assessment of Peace Freedom I and II was accomplished in 1980 in preparation for the coproduction effort (48:1-45).

The F-5E boasts relatively low maintenance manpower requirements. Based upon 36 aircraft and 20 flying hours per month, the estimated manpower requirement is 350 personnel (13:124). In a related estimate of the impact of support requirements, the annual operation and support costs

for this fleet was projected at \$11.1 million in 1984 dollars (13:124).

In terms of specifically managing the Peace Freedom III manpower and training requirements, the

skills gained from the Peace Freedom I and II programs provide the ROKAF with the fundamental skills and manpower resources to efficiently introduce the new F-5E/F configuration into the ROKAF inventory (48:2-23).

Thus, training focused upon providing the additional training to support increased numbers of aircraft, rather than a requirement for formal USAF and contractor programs on the 115000/116000 configurations (48:2-23). The greatest manpower concern faced by the Koreans under the Peace Freedom III program was the large requirement for trained personnel to work in the coproduction facility. During peak production periods, the ROK estimated that the coassembly program would require 750 personnel at the KAL plant, which were to be obtained at the expense of other KAL production programs (76:87).

Thus, in terms of manpower and training requirements under Peace Freedom III, there is a considerable reduction in the cost and extent of formal training for supporting the aircraft. This is attributable to the ROKAF experience with similar technology. The USAF case manager is presented a very uncomplicated subcase for training. The manpower and training difficulties stem from the tasking placed upon the ROK production facility, which is unrelated to Peace Freedom

III supportability. In addition, these skilled KAL technicians are a necessary step in the growth of the ROK defense industry.

The F-5E/F has five items of peculiar support equipment associated with the Peace Freedom III program (51). According to Lt Bell, most of the required support equipment was in-country from the previous Peace Freedom programs. As with any system, however, some test equipment and ground support equipment is unique to this particular configuration (9). For example, one such piece of equipment specified in the ILSP is an AN/APQ(V) -3,-4 Radar Automatic Test System required for the improved F-5E/F capabilities (48:2-6). In total, the case managers have overseen a case for peculiar support equipment (that is, specific to the ROKAF configuration) estimated at \$3,064,000 as of November 1984. The requirement for additional standard support equipment to maintain the added numbers of aircraft was valued at \$5,258,000. In addition, a small case for 55 items of production line support equipment was set at \$691,000, a small price for the benefits of increased production capacity (34).

The ROKAF experience with supply support under Peace Freedom I and II was deemed to "be a valuable asset in establishing support for the Peace Freedom III program" (48:2-19). The Peace Freedom III configurations have a

high degree of commonality with the F-5E/F aircraft presently owned and operated by the ROKAF. Most of the line items of spares and equipment

required for support of common-standard systems are already in the ROKAF inventory. Some quantity adjustments, however, were required due to the increase in the number of systems to be supported (48:2-19).

From the management standpoint, then, supply support is facilitated by these previous purchases. Clearly, definition of requirements, quantities, and dollar estimates for the many standard items can be easily developed and do not require introduction into the ROKAF inventory. In addition, the ROKAF has participated in the Cooperative Logistics Supply Support Arrangement (CLSSA) since 1975 and Peace Freedom III requirements thus become a part of CLSSA renegotiations (32:15). The introduction of the initial standard spares requirement was estimated at \$7,499,000. Non-standard spares, or those unique to the ROKAF configuration, fall under a separate case valued at \$5,491,000 (34).

Managers have emphasized the importance of logistics objectives from the start of the program. In a routine memorandum dated July 1980, case managers at the ALC stated,

We would like to reiterate our concern for the supportability of this program. The Korean Air Force should be well advised that the lead time for common support equipment and engine spares is continually increasing. . . . As the ROKAF current aircraft continue to age, spares consumption should increase making current stock vulnerable to shortages (19).

This highlights the management recognition of the need to ensure that the system is supported throughout its life, as well as the role managers play in foreseeing potential problems before they become critical. In fact, throughout

the Peace Freedom III program, logistics complications and problems have been limited.

Lt Bell relates a problem with the government--furnished aeronautical equipment. Some avionics components were failing after delivery to the ROK, despite 100 percent Defense Contract Administration Services (DCAS) and Air Force Plant Representative Office (AFPRO) inspection at the plant. In this instance, case managers have been working to identify and insure correction of the high failure items (9). This, however, has not been a major stumbling block to program success. In general, the logistics planning and delivery has run smoothly, and there have been only a few minor complications, which are to be expected in any program.

Summary. The nature of the Peace Freedom III program has facilitated the case manager's job, especially in terms of the logistics/support objectives. It is difficult to identify any significant logistics problems, which indicates that purchaser familiarity with similar weapon systems, and manager experience with like systems, aids the management task considerably. Peace Freedom III is thus far extremely successful in providing the Koreans with a defense capability that is suitable to meeting the threat while increasing their indigenous technology, maintaining reasonable and stable acquisition costs, delivering aircraft ahead of schedule, and giving a strong indication of being fully supportable throughout its operating life at a reasonable cost

to the ROKAF. Overall, the program can be considered a success and no major stumbling blocks have been encountered by case managers.

An Advanced Weapon System Case: Peace Voice

As previously defined, an advanced weapon system involves state-of-the-art technology, which is not in the USAF inventory at the time of sale to the foreign government. The ROKAF purchase of the AN/GRC-206 ground control radio system, the Peace Voice program, is such a case. The ROKAF acquisition occurs simultaneously with the "Pacer Speak" program--the acquisition of the AN/GRC-206 system by the U.S. Air Force, Army, Navy, and Marine Corps. The USAF has the primary responsibility for this joint service buy, and therefore, serves as the FMS manager for the system.

The Peace Voice program, although smaller in scope than an aircraft system sale, is an important example of the sale of advanced weapon systems. The LOA was signed in June 1978 and it has been recognized as differing significantly from traditional FMS transactions. Former ILC Peace Voice manager, First Lieutenant Keith Halford, stated in early 1983,

This is an unusual program in that an FMS customer has participated in a program from the conceptualization stage. This is not usually the case as most purchases are from follow-on production (27).

Although unaware of the significance, Lt Halford was managing one of the first major sales of an advanced weapon system--a type of FMS purchase which is now becoming more common.

Performance. The AN/GRC-206 is a tactical mobile ground communications system. The ROKAF ordered 134 units to replace the system it presently uses. It is an integrated system composed of three radios which provide HF/SSB, VHF/FM, VHF/AM, and UHF/AM communications with full remote control up to a distance of two miles (41:65). This system is identical to that developed for U.S. military use except for less capable communication security (COMSEC) in the FMS version (41:37B). Thus, it is correct to claim that an FMS configuration was established at the time of sale.

The AN/GRC-206 is designed for installation in and operation from M-151 utility vehicles (jeeps) or M-113 armored personnel carriers (42). In 1979 the ROK received delivery of 134 M-151 jeeps for use with the AN/GRC-206. The jeeps were obtained from the U.S. as excess property at a substantial cost savings (28:1). These vehicles have remained unused in anticipation of the radio system delivery (10).

The system's prime contractor, Magnavox, is directly responsible for manufacturing only the VHF/UHF/AM transceiver in this case. The HF transceiver is manufactured by Hughes Aircraft Company and shipped as government-furnished equipment, while the VHF/FM transceiver is supplied by the ROK (27). Magnavox retains responsibility for contract performance and for the acceptability of the U.S. manufactured components.

The communication system is intended to improve upon the capabilities of current ROKAF systems. It meets all

requirements for mobility on unimproved cross country terrain, can be transported by air, and air dropped (27).

Although these capabilities were delineated at program inception, it must be emphasized that there was no actual contractor nor system selected until November 1980--over two years after the LOA was signed (27).

Cost. The total dollar value of the Peace Voice program LOA is relatively low at \$17,733,235, which includes the cost of the radios, support equipment, spares, vehicles, and administrative charges (27). For the 134 AN/GRC-206s, the cost per unit can thus be set at approximately \$132,337. A low dollar figure does not, however, imply that less effort is required to manage the case.

Cost estimates for the AN/GRC-206 radio units themselves were undoubtedly the most difficult figures for managers to develop considering the nonexistence of the actual system in 1978. The subcase for the basic radio units was estimated at \$12,155,006 but subsequent estimates, as the system was selected and entered production, revised the figure downward to \$10,788,919. After accounting for incentive payments and miscellaneous costs, a potential excess of \$1,066,087 was identified (27).

In late 1981, case managers recommended that \$200,000 of the excess funds be set aside for training and \$906,687 could be deleted from the program (27). However, over the next few months, they revised their recommendations. They

recommended that the \$906,687 deletion of funds be delayed until the program better stabilized. Major reasons were:

- A. Lack of good cost data on training
- B. New requirement for minimum of one year depot maintenance by contractor
- C. Slow identification of . . . spares makes it difficult to make good cost estimates of final costs (27).

Essentially, case managers recognized the volatile nature of a developmental program and wisely held these funds as a management reserve to protect against unforeseen contingencies.

This downward revision of cost estimates can be viewed as a positive aspect of the Peace Voice program, especially considering the sensitivity of the ROK to costs. Case managers obviously did not intentionally inflate the earlier estimates, but based them upon the best information available. Unquestionably, since the system was still undergoing research and development as well as contractor selection, cost estimates could just as easily have been undervalued with very different results and implications. Fortunately, in Peace Voice this did not occur, but the potential clearly exists in advanced system sales for case managers to be confronted with an underfunded program.

Schedule. The Peace Voice delivery schedule has been a source of great difficulties for all concerned with the program. The program has been impacted by one schedule slippage after another. The first production deliveries to the ROKAF freight forwarder, as contractually negotiated, were originally expected to begin in May 1983 and conclude in May 1984

(5). By early 1983, however, the schedule had been revised contractually to reflect a more realistic delivery schedule. These deliveries were to begin in July 1983 as shown in Table IV (28). This schedule reflects the first major documented schedule slippage.

TABLE IV

March 1983 Revised Peace Voice AN/GRC-206 Delivery Schedule

1983	JUL 1	AUG 3	SEP 9	OCT 10	NOV 13	DEC 13	
1984	JAN 13	FEB 13	MAR 13	APR 13	MAY 13	JUN 13	JUL 7 (27)

These deliveries could not be met and the Peace Voice Support Review held at the Sacramento ALC in October 1983 resulted in a new schedule. "Contractor representatives indicated that the first two GRC-206(V)2 units being provided to Korea under Peace Voice would be shipped in late November 1983" (5). Table V reflects this updated schedule and the four-month delay.

TABLE V

October 1983 Revised Peace Voice Delivery Schedule

1983	NOV 2										
1984	FEB 2	MAR 2	APR 1	MAY 1	JUN 1	JUL 1	AUG 2	SEP 5	OCT 8	NOV 12	DEC 10
1985	JAN 12	FEB 12	MAR 12	APR 12	MAY 12	JUN 12	JUL 6	AUG 9			

(38)

By mid-November 1983, Peace Voice managers received word from Magnavox that a new delivery schedule was again necessary. This schedule proposed to begin deliveries in February 1984 and complete them in March 1985 (38). This represents another delay of three months. At this point the Koreans were understandably skeptical and "questioned whether any delivery schedule proposed by the contractor is believable" (5).

This schedule was subsequently readjusted to reflect initial delivery in May 1984, but in mid-May, following a program review at Magnavox, the schedule once again could not be met. A delay of three to six months was expected (12). The final schedule was established in July 1984 and reflected a delay of five months, as shown in Table VI. Overall, the Peace Voice schedule is documented to have slipped five times from the original contracted delivery date of May 1983, representing a total delay of 17 months.

TABLE VI

July 1984 Revised Peace Voice Delivery Schedule

1984	OCT 7	NOV 7	DEC 7			
1985	JAN 19	FEB 19	MAR 19	APR 18	MAY 19	JUN 19 (20)

Although the first seven units were delivered to the ROKAF's freight forwarder for shipment to Korea on 31 October 1984, on-time deliveries have remained complicated. Superficial

cracks were detected in the equipment rack on several of the radio units following these first deliveries. Although the cracks do not affect system capability, they are unacceptable under the terms of the contract. Magnavox continued to produce the radios, but shipment was temporarily delayed until the issue could be resolved (10).

The reasons for these numerous delays can be attributed to the developmental nature of the AN/GRC-206 system. As noted, there was no radio system at the time of ROKAF purchase, and so the design naturally changed as the program progressed. Basically, a configuration was set at the time of sale, but modifications were necessary to field the actual radios. Thus, in an advanced system sale, with no operational system tested or fielded, the purchaser is affected by the problems discovered during the testing of the new system. In Peace Voice, reliability testing showed contractor performance was unsatisfactory and system modification was required (28). Magnavox was unable to comply with system mean time between failure specifications.

The contract specifies a minimum of 1200 hours of Mean Time Between Failure (MTBF) with improvement to the target MTBF of 2400 hours. The reliability testing is only showing a 300-400 hours MTBF (38).

There was an additional problem with the HF power amplifier failing to meet specified output requirements (29). It should be noted that the components manufactured by the ROK have been trouble-free (10).

Reliability testing at Magnavox was not the only problem causing schedule slippages. Subcontractor shortfalls also had an impact on the program. Quality control problems with both Texas Instruments and Rockwell-Collins components contributed to the many delays (10).

The impact of these schedule slippages is significant both from the USAF and the ROKAF point of view. Clearly, the ROK faces an ever-present threat which the Peace Voice system is intended to help counter. The impact of its delinquent fielding upon ROKAF readiness and capability cannot be suitably ascertained, but it is clearly not beneficial.

Moreover, the delinquent delivery caused political difficulties for some Koreans involved with the project. Says ILC case manager Captain Scott Byers, "For a while the Koreans became disinterested in the program and the slippages because it was a touchy issue. Some of them lost their jobs" (10).

Not only have the delays been a sensitive issue within the ROKAF, but have also caused difficulties for the USAF. Most significantly, the program's numerous delays "have served to undermine AFLC's credibility with the Korean Air Force" (5). Since the LOA is a contractual obligation, the USAF as the Peace Voice manager, agreed to deliver the system on a specified schedule. Although they have little direct control over contractor performance the USAF entered

into a contract and the Koreans hold the USAF responsible for compliance.

Furthermore, the delivery delays of the ROKAF units directly impacted the USAF's receipt of the radio system. As the delivery date stretched out, the USAF was forced to make concessions to the Koreans. Normally, the USAF would take delivery on the first units produced and begin training and operational test and evaluation. However, as the time frame was extended, the U.S. agreed to split the first ten units produced giving three to USAF forces and seven to the ROKAF (20). This numerical concession was extended throughout ROKAF deliveries, which can be seen in Table VII. The established delivery schedule gives "the Korean's 70 percent

TABLE VII

AN/GRC-206 Deliveries to the ROKAF and USAF

	(84) OCT	NOV	DEC	(85) JAN	FEB	MAR	APR	MAY	JUN	JUL
ROKAF	7	7	7	19	19	19	18	19	19	
USAF	3	3	3	5	5	5	6	5	5	12
									(20)	

of the AN/GRC-206 units available through March 1985. Previous delivery schedules had a 50/50 split between ROKAF and USAF requirements" (38).

Program managers, who have little influence upon contractor performance, and therefore, limited ability to avert schedule slippages, are placed in an awkward position. They must manage the LOA terms and provide answers to the Military

Assistance Advisory Group in Korea, Korean liaison officers and officials, as well as to higher USAF and DOD organizations. They can provide explanations and offer suggestions, but they are powerless to avert the delays.

One important management concern throughout the schedule slippages was to avoid compromising the system's quality in an effort to achieve delivery to the Koreans. Following meetings held at Magnavox in November 1983, then ILC Peace Voice program manager Thomas Koepnick wrote, "I believe we must temper our desire for early deliveries with a concern for reliability and quality" (38). He further observed,

The delivery delays on this program have been a source of concern and embarrassment to Korea and AFLC, but it would be even more embarrassing for the USAF to provide unreliable radio sets to Korea (38).

Clearly, in this instance the case manager recognized an intolerable situation, and provided sound guidance to avoid making the situation even worse.

Logistics. Considering the extent of involvement with and concern over the delivery schedule, it would have been easy for managers to neglect other program objectives. The supportability of Peace Voice has been a constant concern. Wrote former case manager Koepnick, "This program will need continued close attention and management support by the ILC and SM-ALC to assure that Korea's requirements are properly supported" (38). Undoubtedly, from the previous discussion, system reliability has been a major consideration, but maintenance requirements have also undergone scrutiny.

In determining maintenance level support requirements, the USAF decided it was necessary to contract with Magnavox for interim depot support, not to exceed two years. This was repeatedly discussed with the ROKAF and case managers recommended following the example set by the USAF. A sub-case established for approximately one and one half years of depot maintenance was possible without increasing program funding by transferring the excess funds within the program (27). The issue was not easily resolved, as the ROKAF had identified a depot repair site and preferred in-country repair (29). The ROKAF eventually agreed to interim depot support at Magnavox, but should have their own depot capability by 1987. Existing ROKAF facilities are considered adequate to support the AN/GRC-206 maintenance requirements (10).

The necessity for contractor depot repair resulted from difficulties in provisioning for spares and support equipment. In discussing program problem areas in 1983, Lt Halford stated,

provisioning for depot spares would be approximately one year later than originally scheduled. The basic reason was that because of the new development, the contractor concentrated on system design and development. Consequently, development of support equipment and identification of spares, especially depot type, suffered (27).

This late provisioning was not deemed to be a major stumbling block. "With the inevitable delay of the GRC-206 deliveries, there is reason to believe that the spares for the GRC-206 will be delivered concurrently with the end

item" (29). However, as late as May 1984, spares provisioning was incomplete. The failure of the HF amplifier to meet design specifications resulted in delayed provisioning of the spares for these units (12).

Likewise, in August 1984, shortly before deliveries of the AN/GRC-206 to Korea began, insufficient quantities of the RT1209HF unit, which drives the amplifier, were available. The ALC was asked to release from USAF assets some of its in-stock spares of this unit, but did not choose to do so. Wrote case manager Byers, "Without the RT1209HF units the AN/GRC-206 is virtually useless to Korea" (11).

Capt Byers further states that spares provisioning was still being accomplished as late as October 1984. The ROKAF received more spares than they wanted and items they did not need. Case managers worked to resolve this problem, and Byers now believes that adequate support has been identified (10).

In meetings held at Magnavox in late 1983, it was suggested that the ROKAF would benefit greatly from formal training on the system and contractor support in installing and operating the radios, but the ROKAF did not elect to establish a subcase for this. Instead, they received two pre-production units and learned the system through hands-on experience. Byers believes that with their experience on previous systems and these pre-production models, the Koreans should have few problems operating the units (10).

It is evident that AN/GRC-206 support requirements have been greatly complicated as a result of the research and development involved in the case. Despite the low overall program cost, there have been ongoing problems with reliability and maintainability, which have especially impacted the system's supply support. In a developed weapon system case, the changing nature of spares requirements and other support issues would be tremendously reduced.

Summary. As a developmental system, the Peace Voice program is considered "volatile" by managers and thought to require very close monitoring (28). Delivery delays caused by poor contractor performance have been a major difficulty. These delays are a result of the fact that the system has been developed since the LOA was signed. Wrote the Director of Material Management at the Sacramento ALC,

It has been our continued concern that we field GRC-206's that meet our engineering spec. This has caused the contractor to redesign and retest several of the GRC-206 assemblies. The contract evolved into a major development effort vs an off-the-shelf procurement, and adequate time was not planned up front for this redesign effort (21).

There was, in fact, concern in early 1983 that the contract would end in default if Magnavox did not improve reliability (28). Had this occurred, case managers would have faced a formidable task in negotiating this situation with the Koreans. Clearly, an advanced system sale presents the case managers with many complications and challenges not present in the sale of mature weapons.

A Second Advanced Weapon System Case: Peace Bridge

The last case to be examined is the very complicated sale of the USAF's most advanced aircraft system, the General Dynamics F-16C/D. The F-16C/D is considered to be an advanced weapon system because it was not in the USAF inventory at the time of sale to South Korea and USAF operational test and evaluation only began at the end of 1984. The first F-16C was delivered to the USAF in July 1984 (4:48).

The C/D model will replace the F-16A/B which is currently flown by the active USAF units. The older A/B model will be transferred to reserve and guard units over a period of time (44:23). As a General Dynamics advertisement so aptly expresses, "The F-16A set the standard of excellence in fighter performance throughout the free world. The new F-16C raises it" (24).

The Korean program, designated Peace Bridge, involves the sale of 30 one-seat F-16Cs and six two-seat trainer F-16Ds (50:62). The LOA was signed in December 1981 at a time when the Koreans sought to upgrade their aircraft inventory. Originally, the Koreans ordered the A/B version, but political pressures and high-level decisions later led the Koreans to request the C/D. The U.S. agreed to this change, and amendment number one changed the LOA to the more sophisticated system (1).

Performance. The F-16C/D is an advanced, multirole, fully fly-by-wire aircraft. It retains the basic characteristics found in the A/B model, but incorporates more advanced

avionics capabilities, improved radar, increased cockpit capability, and added weapons carriage (50:79). In addition, the F-16C/D has increased software capabilities which allow for more advanced systems, which are currently still on the drawing board, to be added at a later date (1).

According to the program management plan,

The export baseline configuration for Peace Bridge aircraft will be USAF Block 30-F-16C/D with normal security deletions . . . The F-16C/D configuration will be an enhanced version of the F-16A/B (an enhancement resulting from the scheduled addition of a number of new features and capabilities). These improvements are the product of the F-16 Multinational Staged Improvement Program (MSIP), to update the F-16 systems and capabilities (6:6-2).

Under this "block change concept," changes are incorporated at one year intervals. Changes are thus keyed to "aircraft block points with the exception of those changes involving safety or correction of deficiencies" (6:6-4).

Although a configuration description was discussed, these provisions for the management of changes anticipated the conduct of the program. The Peace Bridge configuration is constantly changing, and although there is a formal baseline, the numerous changes greatly complicate management of the configuration. The many engineering change proposals (ECPs) on the Peace Bridge F-16C/D are scheduled for incorporation into system over the period from February 1986 to early 1989 (50:85). The program management review from October 1984 lists 15 major configuration changes including an ECP to "seal bond F-16 integral fuel tanks," one that "integrates the USAF standard inertial navigation system,"

and another for "common engine bay production on the F-16C/D" (50:86-87). Table VIII lists these major changes identified by the program review. Clearly, this indicates that the configuration will not stabilize until after the aircraft have entered the ROKAF inventory.

TABLE VIII

Overview of Major Peace Bridge Configuration Changes

<u>ECP Number</u>	<u>Description</u>
0795	Installs provisions for an interim jam resistant UHF radio
0863	Installs cockpit television sensor split screen
0844	Provides security deletions, FMS radar, ROKAF paint scheme
0861	Seal bond integral fuel tanks
0898	Installs dual wiring for radar warning receivers
0899	Incorporates wide angle heads up display
0904	Integrates USAF standard inertial navigation system
0932	Installs crash survivable flight data recorder provisions
0947	Improves the ALR-69 amplifier/detectors
0993	Installs the combined altitude radar altimeter
1033	Installs crash survivable flight data recorder
1106	Common engine bay production
1117	Installs structural routing provisions
1124	Provides wiring and structural modifications for AMRAAM
1137	Memory enhancement of the programmable display generator

(50:86-88)

The F-16 has a radius of action that exceeds 500 nautical miles and a service ceiling of more than 50,000 feet (35:385). This range offers the ROKAF greater performance than any aircraft now in its inventory. As ASD case manager Major David Abati states, "The bottom line on the F-16 aircraft is that it is a multirole fighter that offers superior advantages to anything currently in their inventory" (1).

Cost. The LOA amendment which changed the ROKAF acquisition to the C/D model resulted in increased program costs. The total LOA value was increased from some \$860 million to just over \$930 million (1). Program managers at the F-16 program office consider this cost increase to be basically insignificant relative to the full program value (1).

Each aircraft costs just under \$19 million per unit, and the total LOA is valued at \$932 million (1). The total LOA figure includes, of course, administrative and support costs. By dividing the LOA bottom line by the 36 ordered aircraft, a total per unit figure of approximately \$25.8 million can be established.

These cost figures, however, are still subject to change. According to ASD case manager Captain Richard Alvarado, the Peace Bridge pricing will be definitized in the summer of 1985. Definitizing this late in the program is not the normal procedure, but is necessary on this program because the F-16C/D is developmental (1). During the program review in October 1984, Alvarado further explained that

many item costs have changed from the original estimated values (for example, the first four radars were put on contract at a cost of \$1.434M when the original estimated cost was to be \$500,000), it is difficult, if not impossible to determine how much funding is required in each case. Therefore, USAF believes that the LOA uncommitted amount of \$620.254M in AFSC cases is required. When the firm price proposal is on contract and the long lead is closed out, tracking the actual dollar amounts committed to each case will be greatly facilitated (50:6).

Managers of the Peace Bridge program have transferred funds between subcases on several occasions. As with the Peace Voice program, potential savings were shifted rather than returned to the ROK. Says Major Abati, "Shifting funds is a tool for managers which allows us to deal with weak points" (1). Abati further clarifies the reasoning of case managers with an example. Due to changing the jet engine incorporated in the ROKAF F-16 [to be discussed later in this chapter], the managers were faced with a sizable potential savings on the program.

Instead of decreasing the LOA, we opted to put this money in cases that looked like they might be underfunded. Only one or two cases are known to be underfunded, while several might be, so money is transferred as a management reserve (1).

Here two important points should be emphasized. First, there is the potential for the program funding to be extremely critical. Abati's comment shows that managers are very conscious of the possible lack of adequate funding since the system is so unstable. Recognizing ROK funding constraints, it seems that managers would be concerned about where additional funds would be obtained if subcases did prove to be underfunded. Second, the theme identified in the discussion of Peace Voice is seen here as well: Managers recognize the volatile nature of a developmental program and hold funds as a management reserve against unforeseen contingencies. Unlike a mature weapon system where experience provides relatively complete estimates of program requirements and associated costs, an advanced weapon system has many unknown factors

with which managers must deal. Overall, Peace Bridge funding requires very active and foresighted management. Says ILC Peace Bridge Manager Thomas Koepnick, "The Korean armed forces may resent the amount spent on the buy and the Korean Air Force is alarmed at the suggestion of increased money in the program" (39).

Schedule. Peace Bridge deliveries are scheduled to begin in April 1986 and run through February 1989. The ROK is the lead FMS country, although Egypt was originally to have received the first FMS F-16. This change was a result of the USAF's decision to compete engine procurement between General Electric and Pratt & Whitney (1). The USAF has split the engine procurement between the two contractors with General Electric producing the F110-GE-100 engine and Pratt & Whitney manufacturing the F100-PW-220, which is an upgraded version found on the earlier production F-16's (3). The F-16C/D can accommodate either engine.

It was the earlier Pratt & Whitney engine, the F100-PW-200, for which the Korean had contracted. The USAF decision to change the engine on its F-16C/D provided the ROKAF with three options: they could keep the Pratt & Whitney -200 engine, upgrade to the Pratt & Whitney -220, or purchase the General Electric F110 engine. The Koreans have elected to buy the improved Pratt & Whitney engine to maintain standardization with the USAF (1).

The Egyptians recognized the complications involved and agreed to postpone delivery on their F-16s until the

improved engine could be incorporated. This decision made Korea the lead country since they insist upon the April 1986 delivery date. Korea will also receive these advanced Pratt & Whitney engines several months earlier than the first USAF delivery (39).

Although the first delivery in April 1986 is firm, beyond this initial delivery, the schedule has changed. According to program manager Abati, cost factors are driving the schedule changes.

The more aircraft they can ferry to Korea at one time, the more money they can save, so the Koreans are asking for aircraft to be held. They're driving this request, but they haven't officially requested this delivery change yet (1).

On-time deliveries are further complicated by two main factors says Major Abati:

First, the ROKAF decision-making process in which all big decisions and major components must be approved up to the Ministry of National Defense. This is a lengthy process. Second, contractor slips in development schedules complicate delivery. For example, radar units being delayed at the contractor end and a delay in software being ready affects the changing configuration (1).

Adds Captain Alvarado, "We get an average of ten ECPs a week. There are massive changes" (1).

Clearly, the Peace Bridge delivery schedule is very tentative beyond the initial aircraft delivery date, which has political implications for the Koreans (1). The constant changes in the aircraft configuration, as well as the ROKAF decision-making process and their concern over funding, make

on-time deliveries very uncertain. It is too early to speculate precisely what impact these factors will have upon the schedule, and how many, if any, slippages may occur.

Logistics. Supportability of the Peace Bridge program is an ongoing concern among case managers and has required much attention from them. As a system, the F-16A has demonstrated high reliability and maintainability. It has an established mean flight time between failures of four hours, which exceeds the established average for the F-5E (13:74). This high reliability reduces the maintenance requirements. The F-16A has demonstrated a requirement of approximately 11 maintenance manhours per flight hour, which again, is less than the average for the F-5E (13:75). Although the F-16A has shown these excellent reliability and maintainability statistics, the developmental nature of the F-16C/D has greatly complicated the fulfillment of those support requirements which will enable the Koreans to achieve reliability and maintainability rates like these. States Major Abati, "Very little is known right now and one of our biggest concerns is supportability, including reliability and maintainability" (1). Captain Alvarado adds,

This is just conjecture, but there is likely to be problems in the beginning with these areas. It is mostly a question of time--in the long run they will be maintainable and reliable (1).

The minutes from the October 1984 program management review state that, "Facilities planning continues to be a high-priority consideration" (50:23). The Peace Bridge facilities site survey was conducted to consider ROKAF

AD-A161 707

THE IMPACT OF DIFFERENT LEVELS OF WEAPON SYSTEM
SOPHISTICATION ON THE MAN. (U) AIR FORCE INST OF TECH
WRIGHT-PATTERSON AFB OH SCHOOL OF SYST. E A ROBINSON
SEP 85 AFIT/GLM/LSM/855-68 F/G 15/5

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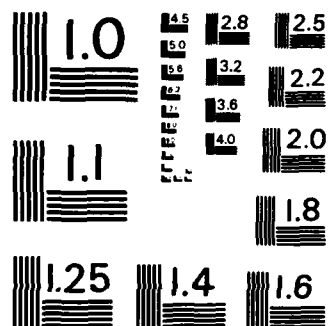
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

requirements to support normal F-16 operations at the organizational and intermediate levels at Taegu Air Base. A facilities milestone chart was established to help manage the identified requirements which include construction of a hydrazine facility, a storage building, a gun maintenance area, an engine test cell, a corrosion control facility, and a BAK-14 barrier. In addition, modifications to field and aircraft maintenance hangars, the engine shop, and the avionics facility necessary (6:8-4). It is the responsibility of ASD managers to "monitor the programming, design, and construction cycle progress to assure facility availability upon aircraft arrival" (6:8-4). Clearly, the F-16C/D requires extensive additions to ROKAF facilities in order for the aircraft to be supported.

The estimated manpower requirements for 36 F-16C/D aircraft at an operational rate of 20 flying hours per month is 484 personnel at an annual operating and support cost of \$26.4 million (13:124). These manpower requirements and O&S costs exceed those of the F-5E under similar conditions. Significant training objectives were established under Peace Bridge to enable Korea to provide the F-16C manpower requirements. The training program includes both pilot training and technical training for organizational and intermediate maintenance (6:11-2).

These training requirements are managed primarily by Air Training Command, but according to Major Abati, training requirements are causing some concern. The ROKAF has planned

to send only two pilots for training, while other countries normally send about twelve. Once again, the driving factor behind this decision is money (1). The value of the case for both flying and maintenance training now stands at \$3,450,000 (50:200).

The program management plan initially identified maintenance training for 68 personnel in 17 specialties (6:11-2). USAF technical training plans currently expect 42 students in 11 specialties to begin training in July 1985 (50:206). The training of technicians is clearly fundamental to system supportability and this training is undoubtedly complicated by the numerous configuration changes. A good example of this involves the previously discussed engine change. In this case, without any experience on the new engine, the USAF will no longer be able to provide the training to the Koreans who, instead, will need contractor support (39).

There is a related problem involving the F-16 technical orders (T.O.'s). Since the C/D model is introducing new avionics into the ROKAF inventory, the Koreans requested T.O.'s in order to learn about the systems. However, the USAF has been unable to provide these T.O.'s because Koreans receive country-specific T.O.'s, which differ from those used by the USAF. These country-standard T.O.'s are still being contracted (39). Since Peace Bridge involves a developmental system, technical orders are not readily available to the country as would be the case with a mature weapon system. In this program, "T.O. development began in August 1984. T.O.

validation is to start in February 1986 and deliveries will occur from November 1985 through February 1986" (50:3).

Since Peace Bridge involves the introduction of a new weapon system into the ROKAF inventory, the requirement for support equipment is significant. The subcase for standard support equipment is valued at \$11,235,000 (50:169). The AFSC-managed subcase for developmental support equipment is \$34,029,000 (50:69). Thus, support equipment for 36 F-16s is estimated to cost the ROKAF \$45,264,000. There are some 259 different items of developmental support equipment comprising some 423 individual pieces required for the Peace Bridge program (50:98). These requirements are based upon standard USAF F-16 support equipment needs.

There is no question that a system as sophisticated as the F-16C/D requires numerous test sets and specialized support equipment. Especially taxed is the requirement for various pieces of equipment to support the avionics intermediate shop, which performs the maintenance on the very complicated F-16C/D avionics systems (6:12-7). According to the briefings provided at the program management review, delivery of support equipment is proceeding with only a few minor problems and ROKAF requirements will be adequately supported (50:15).

Initial supply support requirements call for ROKAF F-16 spares to include "nine months of support for airframe, avionics, armament, engine, and support equipment" (6:12-10). Follow-on support is to be provided primarily through the

Cooperative Logistics Supply Support Arrangement. This is the "largest single area of increase in the ROKAF's follow-on support program" at an increased expense to the ROKAF CLSSA case of \$9.9 million (50:30). Cost again becomes a major force as program manager Abati explains, "We recommend a long list of spares, but they only buy a certain quantity of what is recommended. Cost is the biggest driver without question" (1).

There have been many problems with spare parts because the system is developmental. ILC manager Koepnick describes what has been happening,

As engineering change proposals are approved and design change notices [DCNs] are issued, there is an impact on the spares that are ordered, shipped, or in-country. Parts become obsolete (39).

Between October 1983 and October 1984, 2552 DCNs were received (50:47). The DCNs fall into one of three different categories: (1) Deleted, which are items that will not be replaced, (2) Deleted/Replaced, which are items deleted and then replaced by another item, and (3) New Items (50:46-47). Over the same time frame in which the 2552 DCNs were received, \$422,488 worth of spares that had been shipped to Korea were affected by the DCN actions, and of these, 41 percent or \$172,777 can still be utilized by the ROKAF (50:47).

The USAF is buying back obsolete items as possible, but there is no obligation to do so. ILC manager Koepnick states, "Staff has determined that the U.S. has not erred, but that this is a cost of doing business and the Koreans must absorb it" (39). However, Koepnick also explains that the Odgen ALC

conducted a study to determine the impact of the in-country spares that became obsolete. They found that most of the DCNs referred to changes in Source, Maintenance and Recoverability (SMR) codes, which means the item is still usable. Moreover, aircraft tires were the single largest item that was changed, and the USAF bought these back (39).

The engine change also created support difficulties, says Koepnick. Most of the engine support equipment was already in-country when the decision to change engines was made. Most components, however, were still on order and could be cancelled or diverted to the USAF. In either case, the new engine means that case managers must realign funds for additional spares and support equipment (39).

It is clear that definitizing spares requirements and support equipment is greatly complicated by the constant change to the F-16C/D configuration. As case manager Koepnick states, "The problems mostly arise because it's a developmental system. The question is: Just what are we supporting?" (39).

Summary. The Peace Bridge program is volatile and requires aggressive management action to handle the day-to-day changes, to keep the program within cost objectives, to assure on-time delivery, and to provide full supportability. It is undoubtedly a tremendous challenge. Says Captain Alvarado,

The C/D is the first time the U.S. has tried selling developmental aircraft. Prior to this we sold pretty simple aircraft or ones that had been in the U.S. inventory for years. But this is the first

time for selling a system on the cutting edge of technology and new to the USAF. Being under development creates many problems which are then complicated by selling the system to other countries (1).

Beyond the fact that a developmental system causes problems, Major Abati further explains how the Koreans complicate the management effort. He says,

The ROK is so used to using USAF systems that they feel very experienced and comfortable with these systems, but they don't realize they're not getting as simple a system as they have now. They view the F-16 as just another aircraft, but it's not (1).

Summary and Concluding Observations

This, then, concludes the examination of the three cases and the management effort involved in fulfilling cost, schedule, performance, and logistics objectives. The developed weapon system case, Peace Freedom III, illustrates a program that has been well-managed and has encountered few difficulties. The program objectives are being met or exceeded. On the other hand, the advanced system cases, Peace Voice and Peace Bridge, indicate greater complications in fulfilling the objectives. Managers on both of the advanced system cases have encountered many challenges. The following chapter will examine in-depth the implications of the level of sophistication upon management as suggested by the cases that have been presented.

V. Implications of Managing Different Levels of Sophistication and Conclusions

Chapter four related the management challenges associated with the three ROK cases--Peace Freedom III, Peace Voice, and Peace Bridge. It is now important to synthesize this information and to analyze the implications of the sale of different levels of sophistication upon the case manager's job, as suggested by the above cases. The level of weapon system sophistication that is sold through FMS involves two important and related issues. The first issue is: What level of sophistication should be sold through FMS, and especially, to Third World nations? This issue is beyond the control of case managers, and therefore, beyond the scope of this thesis. The second issue concerns the impact upon the management requirements of this decision to sell different levels of sophistication. It asks: How does weapon system sophistication affect the manager's ability to fulfill the terms of the LOA? This second issue is the thrust of this research effort and will be the focus of the following pages. After addressing these implications, potential management actions, which may improve the fulfillment of program objectives on advanced system cases, are presented. Finally, as a conclusion, this chapter seeks to answer the research questions that were presented in chapter one.

Implications of a Developed System Sale

The Peace Freedom III F-5E/F case reveals four significant trends in this particular management effort: stability, minimization of costs, reliability, and assured fulfillment of objectives. Stability appears, in many ways, to be a key factor in program success. A developed weapon system has a stable, well-defined configuration which is subject to few changes. The stability of the weapon system facilitates the manager's job, and in turn, it is clear that the F-5 baseline is fixed, cost estimates fluctuate little, and support requirements were definitized early and are being fulfilled with few obstacles. In other words, a developed weapon system presents the case manager with a stable, straightforward management task. There are few surprises over the course of the program.

This type of weapon system also indicates a minimization of costs. The F-5 unit cost on the Peace Freedom III program was determined to be approximately \$6.1 million, inclusive of all related support. However, as a coproduction program, this figure is somewhat misleading since the ROK incurs additional, in-country production costs. From the previous Peace Freedom cases, however, a flyaway cost for the aircraft system alone can be established. Cost data from 1981 places the F-5E/F per unit cost at between \$2.9 million and \$4.2 million (2). In addition, in 1980 Defense Marketing Systems valued the F-5E at \$2 million per unit and the F-5F at \$3 million per unit (75:197,774). It

is reasonable to conclude that in 1984 dollars the F-5 would be valued at under five million dollars each. In the current aircraft market, this price is fairly low, which is to be expected on a less sophisticated weapon system.

In addition to lower costs of the weapon system itself, system maturity appears to reduce the costs for support requirements. Previous experience with F-5 sales made definition of spares and support equipment accurate and easy. With a developed weapon system it is unlikely that many procured items will become obsolete prior to aircraft delivery. It is equally unlikely that unnecessary items will be purchased for the country's stocks. Finally, Peace Freedom III illustrates that experience with previous sales of the system leads to good cost estimates, and program monies are more likely to be returned to the purchaser than to be increased.

Peace Freedom III also indicates that developed weapon system cases are more reliable. Since the weapon system has undergone production before and has completed operational test and evaluation, few components fail to meet standards upon delivery. Government inspections have proven that the system's reliability requirements are satisfactory, and the case manager can be certain that the country will receive the system performance for which it has contracted.

Finally, the Peace Freedom III case shows that there is a strong assurance that program objectives will be fulfilled. The expected level of performance and reliability is assured.

The cost estimates are fixed, and funding requirements are at a minimum. The delivery schedule is realistic and can be met since there are few, if any, modifications to the system during production. Lastly, there is every indication that the weapon system will be fully supportable upon delivery. Training is facilitated by the wealth of experience available on the system and the few design changes, spares and support equipment provisioning is simplified, technical orders have been developed, and the lead times necessary to have the support base in place for delivery are fairly well known.

The developed weapon system leaves very little to guesswork. It reduces the turmoil of the program and presents managers with the main task of tailoring the program to the needs of the specific purchasing nation. Factors which are largely under the control of case managers, such as pricing and spares definitization, can be properly fulfilled. Those factors over which managers have little influence, like schedule delays and contractor performance, are minimized by the maturity of the weapon system and the experience of the managers with the system and its potential weaknesses.

Implications of an Advanced System Sale

The many benefits accruing to a developed weapon system sale are clearly not present in the highly sophisticated advanced weapon system cases. Instead, the Peace Voice and Peace Bridge cases indicate that advanced weapon sales are

faced with instability, higher costs, uncertainty, and unfulfilled expectations. Instability is a major complicating factor to this type of sale. Recall Peace Bridge manager Alvarado's statement that, "We get an average of ten ECP's a week. There are massive changes" (1). Although an attempt is made to establish a system configuration for the program, the numerous engineering changes radically alter the delivered system from the contracted system. The program is volatile; everything is in a state of flux.

Clearly, the system's instability affects the management of all objectives. Spares may become obsolete before the system rolls off the production line. Training is complicated by the changing baseline, and technical orders once produced must be continually updated. Peace Bridge illustrates that costs are constantly being revised--some subcases are undervalued, others overvalued. The delivery schedule, as in the Peace Voice case, is very tentative upon the system entering production as initially contracted. If the system changes too much, this schedule cannot be met.

The advanced weapon cases also indicate higher overall costs than found in developed system cases. The F-16C, for example, is estimated in 1984 dollars at a per unit flyaway cost of \$13.8 million (13:71). This is to be expected since the aircraft is highly sophisticated, but the cost is significantly higher than for the F-5. In addition to the aircraft itself, there are many other costs to be considered. Peace Bridge illustrated a large requirement for the construction of new facilities, for state-of-the-art test and

support equipment, and for more training on the complex system. There is also the potential for hidden costs such as in-country spares that become obsolete before the aircraft is delivered and modifications to the aircraft that will be occurring for years to come.

Both Peace Voice and Peace Bridge reveal the great uncertainty that is associated with advanced system sales. Reliability is an unknown, and there is evidence that reliability problems may be present, at least in the short run. There may even be a danger of the contract ending in default, as evidenced by the Peace Voice program. This is due largely to lack of USAF test and evaluation of the developmental system. There is uncertainty with regards to costs and to the feasibility of delivery schedules since the system has never before been sold, managed, or fielded. Obviously, there is no experience with the system, so managers must make judgemental guesses about the actual requirements.

All things considered, unfulfilled expectations are very likely. Expectations about the program are created by two factors. First, they are a function of previous experience with FMS transactions and the conduct of these sales. Second, these expectations are generated by the contractually agreed upon terms of the LOA. The purchasing country, in this case South Korea, expects the USAF to manage and deliver the weapon system just as they always have, but the advanced system sale is, by nature, very different. Managing state-of-the-art technology is fundamentally different

from managing a mature, off-the-shelf type of sale. Neither the USAF nor the ROK have any experience with the foreign military sale of advanced weapon systems that are still undergoing research and development, so fulfilling the expectations of both parties is greatly complicated.

In political terms, these unfulfilled expectations damage the credibility of the USAF and the credibility of Koreans who are associated with the program, as can be clearly seen in the Peace Voice case. The high expectations of receiving the latest, most prestigious weapon system are diminished by the inability of managers to meet the important objectives of the case. The conclusion that can be drawn here is that the management task and the difficulty in fulfilling program objectives increases with the level of sophistication. The more advanced the weapon system, the more difficult the case manager's job. From a management standpoint, the more mature weapon system will result in a far greater likelihood of program success.

Here another question must be raised. Would an intermediate level weapon system such as the Northrop F-20 be a strong alternative? In terms of case management, the intermediate system may not be of any benefit over advanced systems. If the system has not yet undergone USAF test and evaluation and is not in the USAF inventory, as is still the case with the F-20 aircraft, then the problems of fielding an unknown system will inevitably plague managers. However,

the problems associated with the more expensive, state-of-the-art technology will probably not be a factor, and once the intermediate system has been sold and fielded, better management than seen with advanced sales and higher performance than obtained with developed sales is possible. Of course, with no actual F-20 cases at the present time, this is simply speculation.

Potential Management Action

Recognizing that the decision to sell a weapon system is beyond the scope of the case manager, and assuming that higher level decision makers will continue to approve the sale of all levels of sophistication, the case manager must take action to improve the chances of fulfilling program objectives on advanced system sales. Using the knowledge of what elements lead to success in a mature, developed system sale, there are management actions that can ease the difficulties in selling sophisticated weapons.

Time is a key factor in advanced system sales. Managers must include in their planning the additional time necessary to design and change the system and its associated requirements. A memorandum concerning the Peace Voice program from the Director of Material Management at McClellan AFB stated that, "adequate time was not planned up front for this redesign effort" (21). It is clear that managers must recognize that advanced system sales will most likely require more time than developed system sales to design, produce, and

deliver. If this time factor is incorporated into the overall program, the ability to fulfill case objectives will improve considerably.

In order to generate this additional time, managers must clarify the nature of advanced system sales with country representatives prior to the signing of the LOA. The purchasing nation must recognize that the sophisticated system is much more difficult to manage, and that change is an inevitable force in the sale. Representatives must clearly understand that it is a developmental effort and not the sale of a mature system to which they are accustomed.

One practice already displayed by managers on all programs should be continued. This is the practice of shifting monies, from subcases that are identified as being overfunded, to subcases that are underfunded. It is obviously very difficult to obtain increased funding from a country such as South Korea. Thus, the case manager who promptly recognizes that other subcases may be underfunded, and that this excess funding may be transferred through certain procedural and notification mechanisms, prevents many potential problems.

This points to a key element in successful case management--foresight. Managers who are able to identify potential problem areas and monitor or plan accordingly will be more successful in fulfilling program objectives. Several managers spoke of the reactive role that case managers are often forced to assume, and this is especially true on advanced

system sales. However, Major Abati suggests that, "In terms of managing, experience changes the role from reactive to foreseeing potential problem areas" (1). This is a very important fact. Managers become experienced as a result of the time they spend working foreign military sales, but the corporate knowledge of managing advanced, developmental weapon systems will only come with experience in selling these weapons. Thus, whether or not advanced system sales can be managed as smoothly as developed weapon system cases remains to be judged in the years to come.

Conclusions

Research Question One. What are the policies and economic factors leading to the U.S. decisions to sell different levels of weaponry to South Korea; in other words, what motivates the U.S. to sell the types of weapons it sells?

The U.S. and South Korea have a long-standing, firm commitment to protect the peace and stability of the region. Under this commitment, the U.S. and the Administration in office pursue national security objectives, regional security objectives, a specific defense strategy, and economic policies. The decision to sell different levels of sophistication to the Koreans stems from the political and economic factors intertwined in this important commitment.

Recent trends in arms transfers indicate the scope of foreign military sales has grown and the sale of weapons to Third World nations has risen dramatically. In the past,

the U.S. had sold primarily mature, developed weapon systems, but in the last few years a complete change has taken place and weapons of increasing sophistication are being sold abroad. The challenges that these state-of-the-art weapon systems present to FMS managers differ considerably from those encountered in managing developed weapon systems.

Research Question Two. What is the social, economic, political, and military environment of the ROK that has led to their decision to purchase the F-5E/F, the F-16C/D, and the AN/GRC-206 radio?

Much like any developing nation, the ROK presents a portrait of a country struggling to become self-sufficient, prosperous, stable, and secure. There are many handicaps which South Korea must overcome in this quest. To meet the constant threat from North Korea, the ROK is forced to consider many of the other factors shaping their environment. In purchasing the F-5E/F, the Koreans hope to develop their indigenous arms production industry and to achieve economic objectives. With both the F-16C/D and the AN/GRC-206, the ROK seeks to meet their defense needs with some of the most sophisticated weaponry available. In doing so, they replace aging, less capable systems, and they also pave the way for the U.S. to transfer this advanced technology to them in later years. These ROK purchases are expected to meet their economic, political, and military goals.

Research Question Three: What is South Korea's capability for absorbing developed, intermediate, and advanced

weapon systems; i.e., does a sufficient logistical and monetary base exist?

The South Korean environment and the cases examined reveal that the Koreans are operating under political pressures and severe funding constraints. The developed weapon system is more readily absorbed since it requires less funding and is easier to support. Moreover, the Peace Freedom III purchase is readily absorbed by virtue of previous ROK FMS transactions. For the intermediate and advanced weapon system, however, the costs are greater and the programs are volatile. Although the Koreans may have a sufficient monetary base, it is clearly strained, and at least in terms of the F-16, the ROK must invest a great deal in the logistics base for the system to be adequately supported. Clearly, the ROK is capable of absorbing the developed weapon system, but the logistical and monetary base to support more advanced weapon systems is extremely critical and the ROK's ability to absorb advanced systems remains questionable.

Research Question Four. In terms of the three ROK cases studied, how able is the U.S. to meet stated cost, schedule, performance, and logistics objectives in managing these transactions?

A very clear picture emerges from the Peace Freedom III, Peace Voice, and Peace Bridge cases. The management of developed weapon systems is accomplished with few obstacles. The Peace Freedom III program has been well-managed and all objectives are being met or exceeded. The system performs

as stated, funds are being returned to the Koreans, aircraft deliveries are running ahead of schedule, and the system will be fully supportable.

The advanced system cases, however, present a very different situation. The management task is extremely complicated and the fulfillment of objectives is difficult. The weapon system baseline is continually evolving, funding is uncertain and costs are high, the delivery schedule is in a state of flux, and the numerous logistics requirements are difficult to establish and must be updated constantly. It is questionable whether or not these systems will be supportable after they are delivered. Clearly, U.S. managers have a very difficult task in fulfilling objectives of advanced system sales.

Research Question Five. What impact does the success/failure of the U.S. in fulfilling these objectives have upon the ROK, and what are the alternatives to and implications of selling developed versus advanced systems to them?

The decision to sell different levels of weapon system sophistication is beyond the scope of the case managers who must fulfill program objectives. From their viewpoint, developed systems should be sold through FMS, at least to developing nations, since the objectives of these sales are more readily fulfilled. When the U.S. is unable to meet objectives, as seen in the advanced systems cases presented, U.S. credibility suffers and U.S. readiness may be impacted

in providing equipment to the purchaser. The Koreans expectations cannot be met, political pressures may be present, and budget constraints become a critical factor.

In purchasing weapon systems of different levels of sophistication, the Koreans make trade-offs. They trade performance and technology for cost, schedule, and logistics concerns. Managers are better able to fulfill program objectives when the developed systems are sold, but the Koreans and the U.S. government must ultimately determine which sacrifices are in the best interests of South Korea.

The case manager, then, must seek to manage the program objectives with all the tools, experience, and foresight that can be mustered. Case managers must include additional time in their program planning, they must clarify the nature of the sale with the purchasing nation, they must identify and utilize monies as a management reserve against unforeseen contingencies, and they must use foresight to identify potential deficiencies in their program. Although the case manager cannot influence the decision to sell sophisticated weapon systems, he or she can effectively manage the sale despite the many problems which are inevitable.

Summary and Final Observations

This research was directed at investigating why a country, such as South Korea, can and does purchase a given weapon system, and the implications of the level of sophistication of that system upon the USAF management effort. Clearly, the management of developed weapon systems differs

considerably from the effort necessary to manage advanced system sales. The advanced weapon system case, as compared to the developed system, involves greater instability, uncertainty, unfulfilled expectations and higher costs. Future sales of advanced systems will require careful and concentrated management if the cost, schedule, performance, and logistics objectives are to be fulfilled with the same success as on developed system cases.

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UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED			1b. RESTRICTIVE MARKINGS A161707	
2a. SECURITY CLASSIFICATION AUTHORITY			3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution unlimited	
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE				
4. PERFORMING ORGANIZATION REPORT NUMBER(S) AFIT/GLM/LSM/85S-68			5. MONITORING ORGANIZATION REPORT NUMBER(S)	
6a. NAME OF PERFORMING ORGANIZATION School of Systems and Logistics		6b. OFFICE SYMBOL (If applicable) AFIT/LSM	7a. NAME OF MONITORING ORGANIZATION	
6c. ADDRESS (City, State and ZIP Code) Air Force Institute of Technology Wright-Patterson AFB, Ohio 45433			7b. ADDRESS (City, State and ZIP Code)	
8a. NAME OF FUNDING/SPONSORING ORGANIZATION		8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER	
8c. ADDRESS (City, State and ZIP Code)			10. SOURCE OF FUNDING NOS.	
11. TITLE (Include Security Classification) See Box 19			PROGRAM ELEMENT NO.	PROJECT NO.
			TASK NO.	WORK UNIT NO.
12. PERSONAL AUTHOR(S) Elaine A. Robinson, First Lieutenant, USAF				
13a. TYPE OF REPORT MS Thesis	13b. TIME COVERED FROM _____ TO _____	14. DATE OF REPORT (Yr., Mo., Day) 1985 September		15. PAGE COUNT 125
16. SUPPLEMENTARY NOTATION				
17. COSATI CODES		18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP	SUB. GR.	South Korea Foreign Military Sales Military Assistance Management Advanced Weapons	
05	01			
19. ABSTRACT (Continue on reverse if necessary and identify by block number)				
<p>Title: THE IMPACT OF DIFFERENT LEVELS OF WEAPON SYSTEM SOPHISTICATION ON THE MANAGEMENT OF FMS OBJECTIVES: A STUDY OF THREE ROK CASES</p> <p>Thesis Chairman: Leslie M. Norton, PhD</p> <p style="text-align: right;">Approved for public release: LAW AFB 190-4. <i>John Wolaver</i> 11 Sept 85 LTJG E. WOLAVER Dean for Research and Professional Development Air Force Institute of Technology (AFIT) Wright-Patterson AFB OH 45433</p>				
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT UNCLASSIFIED/UNLIMITED <input checked="" type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS <input type="checkbox"/>			21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED	
22a. NAME OF RESPONSIBLE INDIVIDUAL Leslie M. Norton, PhD		22b. TELEPHONE NUMBER (Include Area Code) (513) 255-5023	22c. OFFICE SYMBOL AFIT/LSM	

In recent years, the sale of weapon systems to foreign nations has involved weapons of much greater sophistication than previously sold. U.S. Air Force Foreign Military Sales managers are faced with fulfilling cost, schedule, performance, and logistics objectives without regard to the level of sophistication involved. This thesis examines the management challenges associated with developed weapon systems and advanced weapon systems through a case study of three South Korean FMS programs.

As a background to the management task, the environments of the U.S. and the ROK are presented, then the three programs are examined in terms of the management of cost, schedule, performance, and logistics objectives. The three cases are: Peace Freedom III, the coproduction of the F-5E/F, Peace Voice, the purchase of the AN/GRC-206 ground control radio, and Peace Bridge, the purchase of the F-16C/D. The impact of the different levels of sophistication upon the management task and how managers fulfill the program requirements are examined in detail. Conclusions regarding the implications of advanced system sales and potential management actions are presented.

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